PB-230 128

NATIONAL INDUSTRIAL WASTEWATER ASSESSMENT, MANUFACTURING YEAR 1963

Thomas J. Powers, III, et al

Federal Water Pollution Control
Administration
Cincinnati, Ohio

1969

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 230 128

NATIONAL INDUSTRIAL WASTEWATER ASSESSMENT
MANUFACTURING YEAR 1963

Thomas J. Powers III
Bernard R. Sacks
James L. Holdaway
Water, Sewage and Industrial Wastes Section
Field Investigations Branch

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
Cincinnati, Ohio

August, 1967
(Reprinted, 1969)

29

NATIONAL INDUSTRIAL WASTEWATER ASSESSMENT
MANUFACTURING YEAR 1963

Prologue

To assist The Cost of Clean Water studies by the Federal Water Pollution Control Administration, efforts were initiated to define in semi-quantitative terms the order of magnitude of industrial waste problems in the United States of America. A literature search of recent industrial wastewater characteristics, water utilization data, and manufacturing production for the base years 1963 and 1964 were implemented into the resulting tabulation "NATIONAL INDUSTRIAL WASTEWATER ASSESSMENT MANUFACTURING YEAR 1963."

It is particularly noteworthy that only the raw (untreated) wastewater volumes and characteristics are presented herein. Information on degrees of inplant control and treatment by Industrial Groups is generally not available at this time. Consequently the 10 Industrial Wastewater Profiles contained in Volume III, The Cost of Clean Water, supplemented the available literature on industrial wastes contributions to the Nation's industrial pollution problem generated by the major manufacturers.

The data presented in this tabulation should be used for guideline purposes only, and should not be applied directly as effluent standards for all industrial wastewater discharges. The investigation of industrial wastewater characteristics produced many estimates of

volume, and physical or chemical characteristics of waterborne wastes generated by specific industries. Although the list of characteristics is extensive, only a few pollutional indicators have been reported in meaningful detail. The five-day biochemical oxygen demand (BOD_5) was reported most frequently. Other characteristics for which considerable data are available are suspended solids, total solids, and pH (a measure of alkalinity or acidity).

The deficiency of data with regard to many individual pollutants emphasizes a void in the general approach to industrial pollution control. There has been a tendency to view and evaluate all industrial pollutants in terms of their analogy with sanitary wastes. Thus waste treatment efficiency is almost universally expressed in terms of percentage BOD_5 removal. It should be recognized that, in the case of industrial pollutants, the effectiveness of control will depend on the removal of specific compounds that may or may not contribute to the standard BOD_5 measured in the waste stream but nevertheless directly affect the water quality of the receiving waters.

Regional planning and basin management will be better able to assess the effectiveness of industrial, municipal, and combined waste treatment when studies and a future Industrial Wastes Inventory generates additional pertinent characteristics beyond the untreated wastewater volumes presented here.

TABLE I

CURRENTLY REPORTED WASTEWATER CHARACTERISTICS BY INDUSTRY GROUPS

SIC Code	201	202	203	204	206	208	22	26	281
Liquid Waste Characteristic	Meat Products	Dairies	Canned & Frozen Foods	Grain Mills	Sugar	Beverages	Textile Mill Products	Paper & Allied Products	Basic Chemicals
Unit Volume	x	x	x	x	x	x	x	x	x
pH	x	x		x	x	x	x	x	x
Acidity					x	x	x		x
Alkalinity	x				x	x	x	x	x
Color							x	x	x
Odor							x		x
Total Solids	x	x		x	x	x	x	x	x
Suspended Solids	x	x	x	x	x	x	x	x	x
Temperature	x							x	x
BOD_5/BODultimate	x	x	x	x	x	x	x	x	x
COD				x		x			x
Oil & Grease	x	x			x		x	x	x
Detergents (Surfacants)							x	x	x
Chloride	x					x		x	x
Heavy Metals:									
Cadmium									x
Chromium							x		x
Copper							x		x
Iron									x
Lead									x
Manganese									x
Nickel									x
Zinc							x		x
Nitrogen:									
Ammonia	x				x		x	x	x
Nitrate							x		x
Nitrite							x		x
Organic	x	x			x			x	x
Total	x						x	x	x
Phosphorus									x
Phenols							x		x
Sulfide							x	x	x
Turbidity							x		x
Sulfate							x	x	x
Thiosulfate							x		x
Mercaptans								x	x
Lignins								x	
Sulfur								x	x
Phosphates								x	x
Potassium								x	x
Calcium								x	x
Polysaccharides								x	x
Tannin								x	
Sodium								x	x
Fluorides									x
Silica									x
Toxicity							x		x
Magnesium									
Ammonia									x
Cyanide									x
Thiocyanate									
Ferrous Iron									
Sulfite								x	
Aluminum									x

TABLE I

CURRENTLY REPORTED WASTEWATER CHARACTERISTICS BY INDUSTRY GROUPS
(CONT'D.)

SIC Code	282	2871	2911	3111	331	3334	3717	3722
Liquid Waste Characteristic	Fibers Plastics & Rubbers	Fertilizer	Petro-leum Refining	Leather Tanning & Finishing	Steel Rolling & Finishing	Primary Aluminum	Motor Vehicles & Parts	Aircraft Engines & Parts
Unit Volume	X	X	X	X	X	X	X	X
pH	X	X	X	X	X	X	X	X
Acidity		X	X	X	X	X	X	X
Alkalinity			X	X	X		X	X
Color	X		X	X			X	X
Odor	X		X				X	X
Total Solids	X	X		X	X	X	X	X
Suspended Solids	X		X	X	X		X	X
Temperature	X	X			X		X	X
BOD_5/BODultimate	X		X	X	X		X	X
COD	X		X		X		X	X
Oil & Grease	X		X		X		X	X
Detergents (Surfacants)	X						X	X
Chloride	X		X	X	X		X	X
Heavy Metals:								
Cadmium							X	X
Chromium				X			X	X
Copper							X	X
Iron			X		X		X	X
Lead							X	X
Manganese			X				X	X
Nickel							X	X
Zinc							X	X
Nitrogen:								
Ammonia		X	X	X	X			
Nitrate								
Nitrite								
Organic			X	X				
Total		X		X				
Phosphorus		X						
Phenols	X		X		X		X	X
Sulfide			X	X	X			
Turbidity			X					
Sulfate	X		X	X				
Thiosulfate								
Mercaptans			X					
Lignins								
Sulfur								
Phosphates		X						
Potassium			X				X	X
Calcium			X					
Polysaccharides								
Tannin				X				
Sodium			X	X				
Fluorides		X	X		X	X		
Silica		X					X	X
Toxicity	X							
Magnesium			X					
Ammonia		X	X		X			
Cyanide					X		X	X
Thiocyanate					X			
Ferrous Iron					X			
Sulfite								
Aluminum								

Table 1 - Summary of 1964 Water Use by Establishments

Code	Industry group and industry	1964								
		Establishments reporting consumption of water			Water intake by purpose			Water intake by purpose--Cont		
		All employees (number)	Value added by manufacture, adjusted (million dollars)	Total (number)	All purposes		Process (billion gallons)	Cooling and condensing		
					Total (billion gallons)	Treated prior to use (billion gallons)		Steam electric power generation (billion gallons)	Other (billion gallons)	(bil
	United States, total[1]	6,396,906	94,706	8,925	14,045	2,932	3,703	2,856	6,529	
20	Food and kindred products	626,106	10,073	2,405	760	113	264	55	337	
201	Meat products	160,645	1,604	443	105	21	52	3	26	
2011	Meat slaughtering plants	114,444	1,249	237	84	19	37	2	23	
2013	Meat processing plants	14,269	179	52	4	(Z)	2	(Z)	1	
2015	Poultry dressing plants	31,932	176	154	17	1	13	(Z)	2	
202	Dairies	76,166	1,105	562	62	7	13	4	29	
2021	Creamery butter	2,995	33	61	8	1	1	1	5	
2022	Natural and process cheese	3,902	53	38	3	(Z)	(Z)	(Z)	1	
2023	Condensed and evaporated milk	7,878	182	93	18	2	1	2	12	
2024	Ice cream and frozen desserts	6,082	118	53	4	(Z)	(Z)	(Z)	2	
2026	Fluid milk	55,309	718	317	31	3	10	1	9	
203	Canned and frozen foods	122,194	1,671	456	92	14	51	1	30	
2033	Canned fruits and vegetables	56,019	683	239	35	3	20	(Z)	10	
2037	Frozen fruits and vegetables	26,818	310	99	34	2	15	(Z)	16	
204	Grain mills	33,668	936	73	58	12	8	5	37	
2046	Wet corn milling	12,572	283	17	48	10	5	5	32	
206	Sugar	28,666	525	123	242	29	105	28	99	
2061	Raw cane sugar	6,661	99	46	123	4	80	17	21	
2062	Cane sugar refining	10,944	231	19	65	3	4	11	47	
2063	Beet sugar	11,061	196	58	54	22	22	-	30	
208	Beverages	95,722	2,241	329	108	18	24	6	54	
2082	Malt liquors	56,835	1,189	119	59	10	14	6	21	
2083	Malt	1,311	31	24	7	2	3	(Z)	3	
2084	Wines and brandy	2,034	55	22	4	(Z)	1	-	2	
2085	Distilled liquor, except brandy	13,189	490	36	30	3	2	(Z)	26	
2086	Bottled and canned soft drinks	19,923	267	114	6	2	4	(Z)	1	
22	Textile mill products	353,340	2,649	603	148	90	106	9	15	
2211	Weaving mills, cotton	127,850	788	123	27	19	16	2	3	
2221	Weaving mills, synthetics	47,750	364	70	10	5	7	(Z)	1	
2231	Weaving, finishing mills, wool	23,596	218	63	19	11	10	1	(Z)	
226	Textile finishing, except wool	47,310	391	133	59	40	48	3	2	
2261	Finishing plants, cotton	30,657	249	58	37	27	31	3	2	
2262	Finishing plants, synthetic	11,734	102	47	17	10	14	1	(Z)	
24	Lumber and wood products	65,871	574	186	151	14	56	63	8	
242	Sawmills and planing mills	36,722	282	96	114	8	33	56	5	
2421	Sawmills and planing mills	36,051	279	93	113	8	33	56	5	
26	Paper and allied products	248,662	3,856	634	2,071	987	1,344	420	187	
2611	Pulp mills	12,994	255	34	279	162	229	12	23	
2621	Paper mills, except building	120,447	1,736	271	1,138	573	736	261	73	
2631	Paperboard mills	56,696	1,098	183	577	232	337	130	81	
264	Paper and paperboard products	31,434	416	72	42	18	20	10	7	
2641	Paper coating and glazing	14,251	228	30	26	14	12	7	5	
2646	Pressed and molded pulp goods	3,581	43	16	5	1	5	(Z)	(Z)	
265	Paperboard containers and boxes	17,698	223	29	5	1	1	1	1	
2654	Sanitary food containers	12,881	178	15	1	(Z)	(Z)	-	(Z)	
2661	Building paper and board mills	9,393	127	45	31	2	21	7	2	
28	Chemicals and allied products	480,053	12,590	1,062	3,889	699	564	651	2,469	
281	Basic chemicals	198,661	5,179	517	3,020	542	431	577	1,892	
2812	Alkalies and chlorine	19,090	381	31	528	31	16	115	363	
2815	Intermediate coal tar products	23,105	514	56	108	41	9	1	90	
2818	Organic chemicals, n.e.c.	75,385	2,394	139	1,708	348	314	328	1,028	
2819	Inorganic chemicals, n.e.c.	67,759	1,541	188	499	95	74	108	284	
282	Fibers, plastics, rubbers	129,876	2,701	176	530	105	67	54	372	
2821	Plastics materials and resins	49,839	1,120	114	218	38	25	13	167	
2822	Synthetic rubber	11,840	330	24	61	15	11	-	44	
2823	Cellulosic man-made fibers	27,222	356	18	152	33	23	19	100	
2824	Organic fibers, noncellulosic	40,976	896	20	98	20	8	21	60	
283	Drugs	65,894	2,214	72	65	7	5	6	49	
2834	Pharmaceutical preparations	58,107	2,089	55	28	3	3	(Z)	21	
284	Cleaning and toilet goods	28,537	1,346	54	32	4	2	3	23	
2841	Soap and other detergents	14,876	725	30	19	2	2	1	13	

B

y Establishments Withdrawing More Than 20 Million Gallons Per Year

1964--Continued															
Water intake by purpose--Continued							Water treated and discharged								
							Point of discharge								
Cooling and condensing		Boiler feed, sanitary service, and other uses (billion gallons)	Establishments recirculating or reusing water (number)	Gross water used, including recirculation or reuse (billion gallons)	Total water discharged (billion gallons)	Amount treated prior to discharge	Public utility sewer			Surface water body			Ground (wells,		
team electric wer generation illion gallons)	Other (billion gallons)						Total	All treated	Part treated	Total	All treated	Part treated	Total	All treated	
2,856	6,529	959	6,142	30,599	13,157	3,825	987	31	271	11,759	390	6,179	195		
55	337	104	1,560	1,280	688	158	241	15	36	353	10	104	79		
3	26	25	266	165	99	39	69	12	14	27	(Z)	12	2		
2	23	21	164	138	78	36	55	12	13	21	(Z)	12	1		
(Z)	1	1	29	8	4	(Z)	4	(Z)	(Z)	(Z)	-	-	(Z)		
(Z)	2	2	73	19	17	3	10	(Z)	1	5	(Z)	1	1		
4	29	16	360	103	58	9	37	(Z)	3	18	(Z)	3	3		
1	5	1	39	10	7	1	4	(Z)	1	3	-	1	(Z)		
(Z)	1	1	27	4	2	(Z)	1	-	(Z)	1	-	(Z)	(Z)		
2	12	3	50	31	17	3	7	(Z)	1	10	(Z)	2	(Z)		
(Z)	2	1	28	10	3	(Z)	2	-	(Z)	1	-	(Z)	(Z)		
1	9	10	216	49	29	6	23	(Z)	1	3	-	1	2		
1	30	10	318	152	87	31	39	1	5	35	2	15	12		
(Z)	10	4	186	51	33	13	18	1	1	10	(Z)	2	4		
(Z)	16	2	71	49	33	12	7	(Z)	2	18	(Z)	10	7		
5	37	7	45	83	50	5	16	(Z)	3	33	(Z)	17	1		
5	32	5	13	72	42	4	12	(Z)	2	30	-	16	(Z)		
28	99	10	99	412	220	55	3	-	1	151	7	34	55		
17	21	6	32	252	113	19	1	-	(Z)	49	-	13	53		
11	47	3	15	74	59	2	1	-	(Z)	57	(Z)	10	1		
-	30	2	52	86	49	34	1	-	1	46	7	12	1		
6	54	24	231	172	93	7	49	1	5	40	-	10	3		
6	21	18	94	94	51	5	32	1	4	18	-	5	(Z)		
(Z)	3	(Z)	19	18	7	1	4	(Z)	(Z)	3	-	1	(Z)		
-	2	1	14	6	4	(Z)	1	-	-	1	-	(Z)	2		
(Z)	26	2	34	45	26	(Z)	8	(Z)	(Z)	18	-	4	(Z)		
(Z)	1	2	63	8	5	(Z)	4	-	(Z)	(Z)	-	-	(Z)		
9	15	17	331	311	135	35	44	2	4	86	8	7	5		
2	3	5	84	87	23	6	7	1	(Z)	16	2	1	(Z)		
(Z)	1	2	52	27	9	2	4	(Z)	1	5	1	(Z)	(Z)		
1	(Z)	2	28	20	18	4	3	(Z)	(Z)	15	-	1	(Z)		
3	2	5	55	67	54	13	18	(Z)	1	35	4	1	1		
3	2	2	33	44	34	8	9	(Z)	(Z)	24	3	1	1		
1	(Z)	2	16	19	16	4	6	-	(Z)	10	1	-	(Z)		
63	8	24	121	217	123	34	4	(Z)	1	115	2	39	3		
56	5	19	67	157	93	30	2	(Z)	1	87	2	34	2		
56	5	19	66	157	93	30	2	(Z)	1	87	2	34	2		
420	187	120	568	6,026	1,947	707	81	4	15	1,823	45	937	11		
12	23	15	32	892	271	74	7	-	1	264	1	102	(Z)		
261	73	68	250	3,095	1,067	374	43	2	10	1,003	32	566	2		
130	81	30	172	1,845	543	242	24	2	4	501	9	247	8		
10	7	5	49	107	38	9	4	(Z)	(Z)	33	1	10	(Z)		
7	5	3	21	69	23	7	1	-	(Z)	22	1	8	(Z)		
(Z)	(Z)	(Z)	14	11	5	1	2	-	-	3	(Z)	-	-		
1	1	1	22	11	3	2	1	-	(Z)	2	-	1	(Z)		
-	(Z)	1	12	5	1	(Z)	1	-	(Z)	(Z)	-	(Z)	(Z)		
7	2	1	43	76	25	5	2	(Z)	(Z)	23	1	12	(Z)		
651	2,469	202	793	7,577	3,662	580	153	7	48	3,384	15	1,517	38		
577	1,892	120	384	5,828	2,887	421	103	4	36	2,679	11	1,100	22		
115	363	35	26	628	509	129	21	-	19	484	-	198	2		
1	90	8	47	277	100	48	11	1	1	89	(Z)	66	(Z)		
328	1,028	38	103	3,319	1,660	114	34	4	5	1,547	6	597	7		
108	284	33	139	1,312	447	103	13	(Z)	9	417	3	198	10		
54	372	36	140	1,148	509	119	24	1	5	473	3	288	9		
13	167	11	89	470	206	41	20	1	4	183	2	82	2		
-	44	5	21	182	57	40	3	-	(Z)	53	1	21	(Z)		
19	100	11	13	233	150	22	1	-	1	147	-	123	2		
21	60	9	17	208	96	17	(Z)	(Z)	(Z)	90	1	63	5		
6	49	5	61	121	42	6	10	1	3	29	(Z)	18	3		
(Z)	21	4	44	79	-	-	-	-	-	-	-	-	-		

More Than 20 Million Gallons Per Year

	Gross water used, including recirculation or reuse (billion gallons)	Total water discharged (billion gallons)	Amount treated prior to discharge	Water treated and discharged: Point of discharge: Public utility sewer: Total	Public utility sewer: All treated	Public utility sewer: Part treated	Surface water body: Total	Surface water body: All treated	Surface water body: Part treated	Ground (wells, spray, etc.): Total	Ground (wells, spray, etc.): All treated	Ground (wells, spray, etc.): Part treated	Transferred to other users	Code
42	30,599	13,157	3,825	987	31	271	11,759	390	6,179	195	(Z)	83	217	
0	1,280	688	158	241	15	36	353	10	104	79	(Z)	28	15	20
6*	165	99	39	69	12	14	27	(Z)	12	2	-	1	(Z)	201
4	138	78	36	55	12	13	21	(Z)	12	1	-	1	(Z)	2011
9	8	4	(Z)	4	(Z)	(Z)	(Z)	-	-	(Z)	-	-	(Z)	2013
3	19	17	3	10	(Z)	1	5	(Z)	1	1	-	(Z)	(Z)	2015
0	103	58	9	37	(Z)	3	18	(Z)	3	3	-	(Z)	1	202
9	10	7	1	4	(Z)	1	3	-	1	(Z)	-	(Z)	(Z)	2021
7	4	2	(Z)	1	-	(Z)	1	-	(Z)	(Z)	-	(Z)	(Z)	2022
0	31	17	3	7	(Z)	1	10	(Z)	2	(Z)	-	(Z)	(Z)	2023
8	10	3	(Z)	2	-	(Z)	1	-	(Z)	(Z)	-	-	(Z)	2024
6	49	29	6	23	(Z)	1	3	-	1	2	-	(Z)	1	2026
8	152	87	31	39	1	5	35	2	15	12	(Z)	5	1	203
6	51	33	13	18	1	1	10	(Z)	2	4	-	1	1	2033
1	49	33	12	7	(Z)	2	18	(Z)	10	7	(Z)	4	(Z)	2037
5	83	50	5	16	(Z)	3	33	(Z)	17	1	-	(Z)	-	204
3	72	42	4	12	(Z)	2	30	-	16	(Z)	-	(Z)	-	2046
9	412	220	55	3	-	1	151	7	34	55	-	21	11	206
2	252	113	19	1	-	(Z)	49	-	13	53	-	20	10	2061
5	74	59	2	1	-	(Z)	57	(Z)	10	1	-	1	(Z)	2062
2	86	49	34	1	-	1	46	7	12	1	-	(Z)	1	2063
1	172	93	7	49	1	5	40	-	10	3	-	1	1	208
4	94	51	5	32	1	4	18	-	5	(Z)	-	(Z)	(Z)	2082
9	18	7	1	4	(Z)	(Z)	3	-	1	(Z)	-	-	-	2083
4	6	4	(Z)	1	-	-	1	-	(Z)	2	-	(Z)	(Z)	2084
4	45	26	(Z)	8	(Z)	(Z)	18	-	4	(Z)	-	-	(Z)	2085
3	8	5	(Z)	4	-	(Z)	(Z)	-	-	(Z)	-	(Z)	(Z)	2086
1	311	135	35	44	2	4	86	8	7	5	-	4	(Z)	22
4	87	23	6	7	1	(Z)	16	2	1	(Z)	-	(Z)	(Z)	2211
2	27	9	2	4	(Z)	1	5	1	(Z)	(Z)	-	(Z)	(Z)	2221
8	20	18	4	3	(Z)	(Z)	15	-	1	(Z)	-	-	-	2231
5	67	54	13	18	(Z)	1	35	4	1	1	-	(Z)	(Z)	226
3	44	34	8	9	(Z)	(Z)	24	3	1	1	-	(Z)	(Z)	2261
6	19	16	4	6	-	(Z)	10	1	-	(Z)	-	-	(Z)	2262
1	217	123	34	4	(Z)	1	115	2	39	3	-	(Z)	1	24
7	157	93	30	2	(Z)	1	87	2	34	2	-	(Z)	1	242
6	157	93	30	2	(Z)	1	87	2	34	2	-	(Z)	1	2421
8	6,026	1,947	707	81	4	15	1,823	45	937	11	-	5	33	26
2	892	271	74	7	-	1	264	1	102	(Z)	-	(Z)	3	2611
0	3,095	1,067	374	43	2	10	1,003	32	566	2	-	1	18	2621
2	1,845	543	242	24	2	4	501	9	247	8	-	4	10	2631
9	107	38	9	4	(Z)	(Z)	33	1	10	(Z)	-	(Z)	1	264
1	69	23	7	1	-	(Z)	22	1	8	(Z)	-	(Z)	(Z)	2641
4	11	5	1	2	-	-	3	(Z)	-	-	-	-	1	2646
2	11	3	2	1	-	(Z)	2	-	1	(Z)	-	(Z)	-	265
2	5	1	(Z)	1	-	(Z)	(Z)	-	(Z)	(Z)	-	(Z)	-	2654
3	76	25	5	2	(Z)	(Z)	23	1	12	(Z)	-	-	(Z)	2661
3	7,577	3,662	580	153	7	48	3,384	15	1,517	38	-	21	87	28
4	5,828	2,887	421	103	4	36	2,679	11	1,100	22	-	9	83	281
6	628	509	129	21	-	19	484	-	198	2	-	-	2	2812
7	277	100	48	11	1	1	89	(Z)	66	(Z)	-	(Z)	(Z)	2815
3	3,319	1,660	114	34	4	5	1,547	6	597	7	-	1	72	2818
9	1,312	447	103	13	(Z)	9	417	3	198	10	-	8	7	2819
0	1,148	509	119	24	1	5	473	3	288	9	-	7	3	282
9	470	206	41	20	1	4	183	2	82	2	-	2	2	2821
1	182	57	40	3	-	(Z)	53	1	21	(Z)	-	(Z)	1	2822
3	233	150	22	1	-	1	147	-	123	2	-	(Z)	-	2823
7	208	96	17	(Z)	(Z)	(Z)	90	1	63	5	-	5	-	2824
1	121	42	6	10	1	3	29	(Z)	18	3	-	3	(Z)	283
4	79	-	-	-	-	-	-	-	-	-	-	-	-	-
2	45	23	2	5	(Z)	1	17	(Z)	10	(Z)	-	(Z)	(Z)	284
6	31	12	2	3	(Z)	1	9	(Z)	5	(Z)	-	(Z)	(Z)	2841
	226	90	17	1	(Z)	(Z)	88	(Z)	53	1	-	1	(Z)	287
	217	89	16	(Z)	(Z)	(Z)	87	-	52	1	-	1	(Z)	2871

2037	Frozen fruits and vegetables	26,618	310	99	34	2	15	(Z)	
204	Grain mills	33,668	936	73	58	12	8	5	
2046	Wet corn milling	12,572	283	17	48	10	5	5	
206	Sugar	28,666	525	123	242	29	105	28	
2061	Raw cane sugar	6,661	99	46	123	4	80	17	
2062	Cane sugar refining	10,944	231	19	65	3	4	11	
2063	Beet sugar	11,061	196	58	54	22	22	-	
208	Beverages	95,722	2,241	329	108	18	24	6	
2082	Malt liquors	56,835	1,189	119	59	10	14	6	
2083	Malt	1,311	31	24	7	2	3	(Z)	
2084	Wines and brandy	2,034	55	22	4	(Z)	1	-	
2085	Distilled liquor, except brandy	13,189	490	36	30	3	2	(Z)	
2086	Bottled and canned soft drinks	19,923	267	114	6	2	4	(Z)	
22	Textile mill products	353,340	2,649	603	148	90	106	9	
2211	Weaving mills, cotton	127,850	788	123	27	19	16	2	
2221	Weaving mills, synthetics	47,750	364	70	10	5	7	(Z)	
2231	Weaving, finishing mills, wool	23,596	218	63	19	11	10	1	
226	Textile finishing, except wool	47,310	391	133	59	40	48	3	
2261	Finishing plants, cotton	30,657	249	58	37	27	31	3	
2262	Finishing plants, synthetic	11,734	102	47	17	10	14	1	
24	Lumber and wood products	65,871	574	186	151	14	56	63	
242	Sawmills and planing mills	36,722	282	96	114	8	33	56	
2421	Sawmills and planing mills	36,051	279	93	113	8	33	56	
26	Paper and allied products	248,662	3,856	634	2,071	987	1,344	420	
2611	Pulp mills	12,994	255	34	279	162	229	12	
2621	Paper mills, except building	120,447	1,736	271	1,138	573	736	261	
2631	Paperboard mills	56,696	1,098	183	577	232	337	130	
264	Paper and paperboard products	31,434	416	72	42	18	20	10	
2641	Paper coating and glazing	14,251	228	30	26	14	12	7	
2646	Pressed and molded pulp goods	3,581	43	16	5	1	5	(Z)	
265	Paperboard containers and boxes	17,698	223	29	5	1	1	1	
2654	Sanitary food containers	12,881	178	15	1	(Z)	(Z)	-	
2661	Building paper and board mills	9,393	127	45	31	2	21	7	
28	Chemicals and allied products	480,053	12,590	1,062	3,889	699	564	651	2,4
281	Basic chemicals	198,661	5,179	517	3,020	542	431	577	1,8
2812	Alkalies and chlorine	19,090	381	31	528	31	16	115	3
2815	Intermediate coal tar products	23,105	514	56	108	41	9	1	
2818	Organic chemicals, n.e.c.	75,385	2,394	139	1,708	348	314	328	1,0
2819	Inorganic chemicals, n.e.c.	67,759	1,541	188	499	95	74	108	2
282	Fibers, plastics, rubbers	129,876	2,701	176	530	105	67	54	3
2821	Plastics materials and resins	49,839	1,120	114	218	38	25	13	1
2822	Synthetic rubber	11,840	330	24	61	15	11	-	
2823	Cellulosic man-made fibers	27,222	356	18	152	33	23	19	1
2824	Organic fibers, noncellulosic	40,976	896	20	98	20	8	21	
283	Drugs	65,894	2,214	72	65	7	5	6	
2834	Pharmaceutical preparations	58,107	2,089	55	28	3	3	(Z)	
284	Cleaning and toilet goods	28,537	1,346	54	32	4	2	3	
2841	Soap and other detergents	14,876	725	30	19	2	2	1	
287	Agricultural chemicals	12,181	240	73	115	18	32	7	
2871	Fertilizers	10,028	176	59	113	18	32	7	
29	Petroleum and coal products	119,334	3,066	268	1,398	168	88	84	1,1
2911	Petroleum refining	111,644	2,942	214	1,388	167	84	81	1,1
30	Rubber and plastics products, n.e.c.	210,403	2,667	280	163	24	19	18	1
3011	Tires and inner tubes	80,320	1,266	51	60	14	9	16	
31	Leather and leather products	26,016	228	85	16	2	14	1	
3111	Leather tanning and finishing	18,275	168	81	16	2	14	1	
32	Stone, clay, and glass products	217,780	3,180	555	249	50	88	82	
3211	Flat glass	18,570	315	17	38	9	10	15	
3241	Cement, hydraulic	29,410	660	145	114	9	15	63	
3295	Minerals, ground or treated	2,214	46	23	25	18	24	-	
33	Primary metal industries	814,412	11,502	785	4,578	699	996	1,380	2,0
331	Steel rolling and finishing	520,949	7,677	296	4,051	602	885	1,099	1,9
3312	Blast furnaces and steel mills	481,867	7,175	200	3,815	598	867	976	1,8
3334	Primary aluminum	17,189	470	20	197	10	13	154	1
37	Transportation equipment	205,556	18,779	417	247	31	58	12	9
371	Motor vehicles and equipment	550,987	10,983	243	127	17	39	1	2
3717	Motor vehicles and parts	541,173	10,866	237	125	16	39	1	2
372	Aircraft and parts	531,061	6,579	109	96	13	16	5	6
3722	Aircraft engines and parts	138,944	1,633	36	60	6	7	3	4

Source: U.S. Bureau of the Census, Census of Manufactures, 1963, "Water Use in Manufacturing, MC63(1)
U.S. Government Printing Office, Washington, D. C., 1966.

53	4	(Z)	(Z)	(Z)	2	1	28	10	3	(Z)	2	
317	31	3	10	1	9	10	216	49	29	6	23	
456	92	14	51	1	30	10	318	152	87	31	39	
239	35	3	20	(Z)	10	4	186	51	33	13	18	
99	34	2	15	(Z)	16	2	71	49	33	12	7	
73	58	12	8	5	37	7	45	83	50	5	16	
17	48	10	5	5	32	5	13	72	42	4	12	
123	242	29	105	28	99	10	99	412	220	55	3	
46	123	4	80	17	21	6	32	252	113	19	1	
19	65	3	4	11	47	3	15	74	59	2	1	
58	54	22	22	-	30	2	52	86	49	34	1	
329	108	18	24	6	54	24	231	172	93	7	49	
119	59	10	14	6	21	18	94	94	51	5	32	
24	7	2	3	(Z)	3	(Z)	19	18	7	1	4	
22	4	(Z)	1	-	2	1	14	6	4	(Z)	1	
36	30	3	2	(Z)	26	2	34	45	26	(Z)	8	
114	6	2	4	(Z)	1	2	63	8	5	(Z)	4	
603	148	90	106	9	15	17	331	311	135	35	44	
123	27	19	16	2	3	5	84	87	23	6	7	
70	10	5	7	(Z)	1	2	52	27	9	2	4	
63	19	11	14	1	(Z)	2	28	20	18	4	3	
133	59	40	48	3	2	5	55	67	54	13	18	
58	37	27	31	3	2	2	33	44	34	8	9	
47	17	10	14	1	(Z)	2	16	19	16	4	6	
186	151	14	56	63	8	24	121	217	123	34	4	
96	114	8	33	56	5	19	67	157	93	30	2	
93	113	8	33	56	5	19	66	157	93	30	2	
634	2,071	987	1,344	420	187	120	568	6,026	1,947	707	81	4
34	279	162	229	12	23	15	32	892	271	74	7	
271	1,138	573	736	261	73	68	250	3,095	1,067	374	43	2
183	577	232	337	130	81	30	172	1,845	543	242	24	2
72	42	18	20	10	7	5	49	107	38	9	4	
30	26	14	12	7	5	3	21	69	23	7	1	
16	5	1	5	(Z)	(Z)	(Z)	14	11	5	1	2	
29	5	1	1	1	1	1	22	11	3	2	1	
15	1	(Z)	(Z)	-	(Z)	1	12	5	1	(Z)	1	
45	31	2	21	7	2	1	43	76	25	5	2	
1,062	3,889	699	564	651	2,469	202	793	7,577	3,662	580	153	7
517	3,020	542	431	577	1,892	120	384	5,828	2,887	421	103	4
31	528	31	16	115	363	35	26	628	509	129	21	
56	108	41	9	1	90	8	47	277	100	48	11	1
139	1,708	348	314	328	1,028	38	103	3,319	1,660	114	34	4
188	499	95	74	108	284	33	139	1,312	447	103	13	
176	530	105	67	54	372	36	140	1,148	509	119	24	1
114	218	38	25	13	167	11	89	470	206	41	20	1
24	61	15	11	-	44	5	21	182	57	40	3	
18	152	33	23	19	100	11	13	233	150	22	1	
20	98	20	8	21	60	9	17	208	96	17	(Z)	
72	65	7	5	6	49	5	61	121	42	6	10	1
55	28	3	3	(Z)	21	4	44	79	-	-	-	
54	32	4	2	3	23	3	42	45	23	2	5	
30	19	2	2	1	13	3	26	31	12	2	3	
73	115	18	32	7	54	22	43	226	90	17	1	
59	113	18	32	7	53	22	34	217	89	16	(Z)	
268	1,398	168	88	84	1,128	99	229	6,161	1,317	1,006	31	2
214	1,388	167	84	81	1,125	98	197	6,146	1,309	1,004	27	2
280	163	24	19	18	110	15	205	336	155	9	24	
51	60	14	9	16	27	7	45	173	56	4	8	
85	16	2	14	1	(Z)	1	40	18	15	7	7	
81	16	2	14	1	(Z)	1	38	18	14	7	7	
555	249	50	88	82	55	24	337	389	218	41	19	
17	38	9	10	15	9	3	17	72	37	8	1	
145	114	9	15	63	26	9	89	151	95	2	1	
23	25	18	24	-	(Z)	(Z)	9	29	24	13	(Z)	
785	4,578	699	996	1,380	2,007	195	581	6,778	4,312	1,178	157	1
296	4,051	602	885	1,099	1,909	159	237	5,806	3,810	1,103	102	
200	3,815	598	867	976	1,822	149	170	5,510	3,576	1,041	88	
20	197	10	13	154	15	14	16	335	191	14	1	
417	247	31	58	12	90	86	315	663	237	24	79	
243	127	17	39	1	20	67	189	422	121	16	55	
237	125	16	39	1	20	66	186	395	120	16	54	
109	96	13	16	5	64	11	94	204	92	7	17	
36	60	6	7	3	45	4	28	108	59	4	8	

tures, 1963, "Water Use in Manufacturing, MC63(1)
D. C., 1966.

	17	3	10	(Z)	1	5	(Z)	1	1	-	-	(Z)	2013
360	103	58	9	37	(Z)	3	18	(Z)	3	3	-	(Z)	1	202
39	10	7	1	4	(Z)	1	3	-	1	(Z)	-	(Z)	(Z)	2021
27	4	2	(Z)	1	-	(Z)	1	-	(Z)	(Z)	-	(Z)	(Z)	2022
50	31	17	3	7	(Z)	1	10	(Z)	2	(Z)	-	(Z)	(Z)	2023
28	10	3	(Z)	2	-	(Z)	1	-	(Z)	(Z)	-	-	(Z)	2024
216	49	29	6	23	(Z)	1	3	-	1	2	-	(Z)	1	2026
318	152	87	31	39	1	5	35	2	15	12	(Z)	5	1	203
186	51	33	13	18	1	1	10	(Z)	2	4	-	1	1	2033
71	49	33	12	7	(Z)	2	18	(Z)	10	7	(Z)	4	(Z)	2037
45	83	50	5	16	(Z)	3	33	(Z)	17	1	-	(Z)	-	204
13	72	42	4	12	(Z)	2	30	-	16	(Z)	-	(Z)	-	2046
99	412	220	55	3	-	1	151	7	34	55	-	21	11	206
32	252	113	19	1	-	(Z)	49	-	13	53	-	20	10	2061
15	74	59	2	1	-	(Z)	57	(Z)	10	1	-	1	(Z)	2062
52	86	49	34	1	-	1	46	7	12	1	-	(Z)	1	2063
231	172	93	7	49	1	5	40	-	10	3	-	1	1	208
94	94	51	5	32	1	4	18	-	5	(Z)	-	(Z)	(Z)	2082
19	18	7	1	4	(Z)	(Z)	3	-	1	(Z)	-	-	-	2083
14	6	4	(Z)	1	-	-	1	-	(Z)	2	-	(Z)	(Z)	2084
34	45	26	(Z)	8	(Z)	(Z)	18	-	4	(Z)	-	-	(Z)	2085
63	8	5	(Z)	4	-	(Z)	(Z)	-	-	(Z)	-	(Z)	(Z)	2086
931	311	135	35	44	2	4	86	8	7	5	-	4	(Z)	22
84	87	23	6	7	1	(Z)	16	2	1	(Z)	-	(Z)	(Z)	2211
52	27	9	2	4	(Z)	1	5	1	(Z)	(Z)	-	(Z)	(Z)	2221
28	20	18	4	3	(Z)	(Z)	15	-	1	(Z)	-	-	-	2231
55	67	54	13	18	(Z)	1	35	4	1	1	-	(Z)	(Z)	226
33	44	34	8	9	(Z)	(Z)	24	3	1	1	-	(Z)	(Z)	2261
16	19	16	4	6	-	(Z)	10	1	-	(Z)	-	-	(Z)	2262
21	217	123	34	4	(Z)	1	115	2	39	3	-	(Z)	1	24
67	157	93	30	2	(Z)	1	87	2	34	2	-	(Z)	1	242
66	157	93	30	2	(Z)	1	87	2	34	2	-	(Z)	1	2421
568	6,026	1,947	707	81	4	15	1,823	45	937	11	-	5	33	26
92	892	271	74	7	-	1	264	1	102	(Z)	-	(Z)	3	2611
50	3,095	1,067	374	43	2	10	1,003	32	366	2	-	1	18	2621
72	1,845	543	242	24	2	4	501	9	247	8	-	4	10	2631
69	107	38	9	4	(Z)	(Z)	33	1	10	(Z)	-	(Z)	1	264
21	69	23	7	1	-	(Z)	22	1	8	(Z)	-	(Z)	(Z)	2641
14	11	5	1	2	-	-	3	(Z)	-	-	-	-	1	2646
22	11	3	2	1	-	(Z)	2	-	1	(Z)	-	(Z)	-	265
12	5	1	(Z)	1	-	(Z)	(Z)	-	(Z)	(Z)	-	(Z)	-	2654
53	76	25	5	2	(Z)	(Z)	23	1	12	(Z)	-	-	(Z)	2661
38	7,577	3,662	580	153	7	48	3,384	15	1,517	38	-	21	87	28
96	5,828	2,887	421	103	4	36	2,679	11	1,100	22	-	9	83	281
65	628	509	129	21	-	19	484	-	198	2	-	-	2	2812
17	277	100	48	11	1	1	89	(Z)	66	(Z)	-	(Z)	(Z)	2815
83	3,319	1,660	114	34	4	5	1,547	6	597	7	-	1	72	2818
99	1,312	447	103	13	(Z)	9	417	3	198	10	-	8	7	2819
30	1,148	509	119	24	1	5	473	3	288	9	-	7	3	282
39	470	206	41	20	1	4	183	2	82	2	-	2	2	2821
21	182	57	40	3	-	(Z)	53	1	21	(Z)	-	(Z)	1	2822
30	233	150	22	1	-	1	147	-	123	2	-	(Z)	-	2823
37	208	96	17	(Z)	(Z)	(Z)	90	1	63	5	-	5	-	2824
41	121	42	6	10	1	3	29	(Z)	18	3	-	3	(Z)	283
44	79	-	-	-	-	-	-	-	-	-	-	-	-	-
29	45	23	2	5	(Z)	1	17	(Z)	10	(Z)	-	(Z)	(Z)	284
33	31	12	2	3	(Z)	1	9	(Z)	5	(Z)	-	(Z)	(Z)	2841
98	226	90	17	1	(Z)	(Z)	88	(Z)	53	1	-	1	(Z)	287
96	217	89	16	(Z)	(Z)	(Z)	87	-	52	1	-	1	(Z)	2871
90	6,161	1,317	1,006	31	2	22	1,240	245	267	5	-	2	42	29
87	6,146	1,309	1,004	27	2	21	1,235	245	263	4	-	2	42	2911
98	336	155	9	24	(Z)	8	128	(Z)	29	2	-	(Z)	1	30
94	173	56	4	8	(Z)	3	47	-	23	1	-	(Z)	(Z)	3011
95	18	15	7	7	-	(Z)	7	1	1	(Z)	-	(Z)	(Z)	31
92	18	14	7	7	-	(Z)	7	1	1	(Z)	-	(Z)	(Z)	3111
97	389	218	41	19	(Z)	4	177	7	51	18	-	11	4	32
93	72	37	8	1	-	(Z)	36	2	27	-	-	-	-	3211
91	151	95	2	1	(Z)	(Z)	90	-	15	1	-	(Z)	3	3241
89	29	24	13	(Z)	(Z)	-	12	-	1	12	-	10	-	3295
	6,778	4,312	1,178	157	1	73	4,104	39	3,063	20	-	7	31	33
	5,806	3,810	1,103	102	(Z)	65	3,688	35	3,019	17	-	6	4	331
	5,510	3,576	1,041	88	(Z)	64	3,469	29	2,883	15	-	6	4	3312
	335	191	14	1	(Z)	-	190	-	15	1	-	(Z)	(Z)	3334
	663	237	24	79	(Z)	25	152	2	78	5	-	3	(Z)	37
	422	121	16	55	(Z)	16	65	2	54	(Z)	-	(Z)	(Z)	371
	395	120	16	54	(Z)	15	65	2	54	(Z)	-	(Z)	(Z)	3717
	204	92	7	17	(Z)	8	71	(Z)	21	4	-	3	(Z)	372
	108	59	4	8	(Z)	5	49	-	3	1	-	(Z)	(Z)	3722

Table 2A - National Industrial Waste Water Assessment, Manufacturing Year 1963
20- Food and Kindred Products - 201 Meat Products

Code	Description of Materials	Live Weight[d] (1,000 lbs)		Unit Values per 1,000 Pounds Live Weight or [Product Weight]: Waste Water Volume (Gallons)	BOD_5 (Pounds)	Suspended Solids (Pounds)	Grease (Pounds)	Nitrogen (Org. & NH_3)* (Pounds)	Estimated Annual Untreated Waste Load: Waste Water Volume (Billions of Gallons)	BOD_5 (Millions of Pounds)	Suspended Solids (Millions of Pounds)	Grease (Millions of Pounds)	Nitrogen (Org. & NH_3) (Millions of Pounds)
INDUSTRY 2011. - MEAT SLAUGHTERING PLANTS													
	Materials, containers, & supplies, total												
013913	Cattle	24,461,078	MEAT SLAUGHTERING PLANTS	500[a]	9.2[a]	12.5[a]	3.3[a]						
013923	Calves	971,492		1,000	10.0	14.0	3.8						
013943	Sheep & lambs	1,421,502		2,000[a]	10.8[a]	15.4[a]	4.2[a]		78[c]				
013933	Hogs	18,194,867			(7.74)[c] - recommends 10.0 for design								
	Fresh & frozen meats:												
201111	Beef	536,604											
201121	Veal	25,721											
201131	Lamb	40,340											
201141	Pork	1,239,644											
201101	Meat materials for sausage & canning, not separable by species	334,793	PACKING-HOUSES	750[a]	6.5[a]	4.6[a]	0.5[a]	0.8[a]					
201161	Processed pork - cured, smoked, etc.	155,249		2,300	14.6	12.0	1.6	1.7					
201102	Other purchased meat, materials (cured beef, cured lamb, goat meat, etc.	83,037		4,300[a]	23.5[a]	22.1[a]	2.8[a]	2.6[a]					
INDUSTRY 2013. - MEAT PROCESSING PLANTS													
	Fresh & frozen meats:												
201111	Beef	746,305											
201121	Veal	36,787											
201131	Lamb	25,619											
201141	Pork	1,480,190											
201101	Meat materials for sausage & canning, not separable by species	539,097	MEAT PROCESSING PLANTS	[1,000]	[6.7][a]	[6.7][a]	[2.5][a]	-	4[c]				
201161	Processed pork - cured, smoked, etc.	184,890		[2,500]			[3.0]	-					
201102	Other purchased meat, materials (cured beef, cured lamb, goat meat, etc.	91,057		[4,000]			[3.3][a]	-					
INDUSTRY 2015. - POULTRY DRESSING PLANTS													
	Poultry killed:												
013311	Young chickens	6,174,731	POULTRY DRESSING PLANTS	1,290[b]	6.6[b]	3.4[b]	no data	0.7[b]	17[c]				
013321	Hens (or fowl)	617,808		2,600[b]	8.0	5.0	" "	1.0					
013331	Turkeys	1,197,589		4,000[b]	11.7[b]	6.6[b]	" "	1.2[b]					
201	Meat Products Est. average or total[d]	53,039,087		1,870	12.0	12.0	3.0	1.5	99[c]	636	636	159	80

[a] USPHS Publication 386, Industrial Waste Guide to the Meat Industry.

[b] USPHS Robert A. Taft Sanitary Engineering Center Technical Report W62-3.

[c] "Design and Performance Evaluation of an Aerobic Stabilization Pond System for Meat-Processing Plants," D. A. Rollag and J. N. Dornbush. Journal of the Water Pollution Control Federation, p. 1805-1812, November 1966.

[d] U. S. Bureau of the Census, Census of Manufactures, 1963. "Food and Kindred Products - Major Group 20, Meat Products, MC63(2)20A," Table 7A. U.S. Government Printing Office, Washington, 1966.

[e] U.S. Bureau of the Census, Census of Manufactures, 1963. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Print Office, Washington, 1966.

*Organic and ammonia.

Table 2B - National Industrial Waste Water Assessment, Manufacturing Year 1963
20- Food and Kindred Products - 202 Dairies

Code	Industry Groups	Estimated Production Millions of Pounds or (Millions of Gallons)	Unit Values per 1,000 Pounds Raw Milk				Estimated Untreated Waste Water Load			
			Waste Water Volume (Gallons)	BOD_5 (Pounds)	Suspended Solids (Pounds)	Total Solids (Pounds)	Waste Water Volume (Billions of Gallons)	BOD_5 (Millions of Pounds)	Suspended Solids (Millions of Pounds)	Total Solids (Millions of Pounds)
2021	Creamery butter	1,422[a],[b]	100[c]/ 110[d]/	1.1[e]/	0.[e]/	2.2[e]/	7[f]/			
2022	Natural and process cheese	2,634[b]/	170[c]/ 200[d]/	1.7[e]/	1.3[e]/	2.[e]/	2[f]/			
2023	Condensed and evaporated milk	7,164[b]/	150[c]/ 150[d]/	1.6[e]/	0.9[e]/	3.5[e]/	17[f]/			
2024	Ice cream and frozen desserts	(956)[b]/	-	-	-	-	3[f]/			
2026	Fluid milk	65,957	225[c]/ 250[d]/	1.0[e]/	0.5[e]/	-	29[f]/			
----	Receiving station	112,902[a]/ (Raw milk)	160[c]/ 175[d]/	0.8[e]/	0.0[e]/	1.7[e]/				
202	General Dairy	112,902[a]/ (Raw milk)	340[d]/	1.6[d]/	1.5[d]/	4.2[d]/	56[f]/	395	225	475
	Est. by Powers	112,902[d]/ (Raw milk)	avg. 500 high 700 low 300	3.5 5.0 1.8	2.0 3.0 0.5	4.2 6.0 3.0				

[a]/ Statistical Abstracts of the United States, 1966.

[b]/ U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics, Dairies, MC63(2)-20B," Table 6A. U.S. Government Printing Office, Washington, 1966.

[c]/ Industrial Waste Treatment Practice, E. F. Eldridge, 1st edition, p. 119, 1942.

[d]/ Supplement D - Industrial Waste Guides, USPHS, p. 1168, 1943.

[e]/ USPHS Publication 298, Industrial Waste Guide to the Milk Processing Industry.

[f]/ U.S. Bureau of the Census, Census of Manufactures, 1963. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Printing Office, Washington, 19[illegible].

Table XC - National Industrial Waste Water Assessment, Manufacturing Year 19[illegible]
20- Food and Kindred Products - 203 Canned and Frozen Foods

Code	Industry Groups	Estimated Production 1,000 Cases (1,000 lbs) or [1,000 Gallons]	Unit Values per 1,000 Cases (1,000 lbs) or [1,000 Gallons]			Estimated Annual Untreated Waste Load		
			Waste Water Volume (Gallons)	BOD_5 (Pounds)	Suspended Solids (Pounds)	Waste Water Volume (Billions of Gallons)	BOD_5 (Millions of Pounds)	Suspended Solids (Millions of Pounds)
2031	Canned and cured seafoods	(756,413)[a]				2[d]	15[e]	
2032	Canned specialties	-				11[d]	10[e]	
2033	Canned fruits and vegetables, preserves, jams, & jellies	(394,400)[b]				33[d]	500[c]	250
2033	Canned fruits (excluding baby foods), total	156,152[c]	40,000[c]	800[c]	150[c]			
20332	Canned vegetables, total	233,203[c]	70,000[c]	1,000[c]	500[c]			
20333	Canned hominy & mushrooms, total	5,358[c]	6,600,000[c]	25,000[c]	7,500[c]			
20334	Canned fruit juices	37,300[a,b]						
20335	Canned vegetable juices	34,854[a]						
20336	Canned & other tomato sauces, pastes, etc., total	72,340[a]						
20338	Jams, jellies & preserves	(875,772)[a]						
2034	Dried & dehydrated food products, total	(1,191,594)[a]				4[d]	20[e]	
2035	Pickled fruits & vegetables, sauces & salad dressing, total	[592,437][a]				3[d]	30[f]	
2036	Fresh or frozen packaged fish, total	(697,198)[a]				1[d]	15[e]	
2037	Frozen fruits, fruit juices, vegetables, & specialties, total	(10,824,000)[b]				33[d]	600[g]	
20371	Frozen fruits, juices & ades	(3,315,000)[b]						
20372	Frozen vegetables	(2,669,730)[a]						
20373	Frozen prepared foods & soups (other than seafood)	(1,697,131)[a]						
203	Canned & frozen foods	-	-	-	-	87[d]	1,190	600

[a] U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics, Canned and Frozen Foods, MC63(2)-20C," Table 6A. U.S. Government Printing Office, Washington, 1966.

[b] Statistical Abstract of the United States, 1966.

[c] Industrial Wastewater Control, C. Fred Gurnham, Academic Press, New York and London, p. 107-108, 1965.

[d] U.S. Bureau of the Census, Census of Manufactures. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Printing Office, Washington, 1966.

[e] Theories and Practices of Industrial Waste Treatment, N. L. Nemerow, Addison-Wesley Publishing Co., Reading, Mass., p. 362-364, 1963.

[f] Cucumber-Pickling Waste Water Treatment and Disposal, T. J. Powers, III, August 19[illegible].

[g] Strength of Wastes from Frozen Food Processing, J. M. Drake, Purdue Industrial Waste Conference, p. 108, 1949.

Table 2D - National Industrial Waste Water Assessment, Manufacturing, Year 1963
20- Food and Kindred Products - 204 Grain Mills

Code	Material	Unit of Measure	Quantity[1/]	Unit Values per Unit of Measure: Waste Water Volume (Gallons)	Unit Values per Unit of Measure: BOD_5 (Pounds)	Unit Values per Unit of Measure: Suspended Solids (Pounds)	Estimated Untreated Waste Water Load: Waste Water Volume (Billions of Gallons)	Estimated Untreated Waste Water Load: BOD_5 (Millions of Pounds)	Estimated Untreated Waste Water Load: Suspended Solids (Millions of Pounds)
2041	Flour mill industry	1,000 bu	691,835	6,500[h/]	18.7[h/]	20[h/]	1[i/]	11	12
2042	Prepared animal feeds	1,000 bu	535,317	-	-	-	2[i/]	32*	-
2043	Cereal preparations	1,000 bu	47,120	-	-	-	3[i/]	31*	-
2045	Blended and prepared flour (wheat flour)	Sack (cwt)	2,919	-	-	-	1[i/]	3*	-
2044	Rice milling (rough)	1,000 lbs	6,294,502	-	-	-	1[i/]	8*	-
2046	Corn, excluding sorghum grain	1,000 bu	171,493[g/]	245,000* 7,500[a/] 183,000[d/]	850* 1,000[f/] 850[b/] 850 170-340[a/] 500[d,e/]	-	42[i/]	146	-
							—	—	—
204	Grain mills						50	231	-

*Estimated.

g/ U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics: Grain Mills, MC63(2)-20D." U.S. Government Printing Office, Washington, D.C., 1966. The total quantity includes wheat, corn, oats, barley, sorgum grain.

a/ Proceedings of the Tenth Industrial Waste Conference, Purdue University, "Aerobic Oxidation of Corn Wet Milling Wastes," Foley and Manterer, p. 173, 1955.

b/ Gurnham, C. F., "Industrial Wastewater Control." Academic Press, New York, p. 125, 131, 1965.

c/ Industrial Water Use, Willis G. Eichberger, 1965.

d/ The Wet Corn Milling Industry - The Wastes and Method for Treatment, G. H. McIntosh. Amer. Maize Prod. Co., Hammond, Indiana, June 1966.

e/ Does not include additional wastes being discharged to the Hammond Municipal Sewer. See p. 344 Proceedings of the 6th Industrial Waste Conference, Purdue University, 1951, "Waste Savings at American Maize Products Co.," by Patten and McIntosh.

f/ If load described in ref. (e) were added to the load described in ref. (f), the unit value = 1.0+ would equal 1,000; therefore, Powers recommends 850 as unit value average.

g/ U.S. Bureau of the Census, excluding sorghum grain.

h/ State of Minnesota Water Pollution Control Commission, private communication, February 20, 1967.

i/ U.S. Bureau of the Census, Census of Manufactures. "Water Use in Manufacturing, MC63(1)-10. U.S. Government Printing Office, Washingon, 1966

Table 2E - National Industrial Waste Water Assessment, Manufacturing Year 1963
20- Food and Kindred Products - 06 Sugar

Code	Material	Unit of Measure	Quantity[a]	Unit Values per Unit of Measure: Waste Water Volume (Gallons)	BOD_5 (Pounds)	Suspended Solids (Pounds)	Total Solids (Pounds)	Estimated Untreated Waste Water Load: Waste Water Volume (Billions of Gallons)	BOD_5 (Millions of Pounds)	Suspended Solids (Millions of Pounds)	Total Solids (Millions of Pounds)
2061	Raw cane sugar	Sh.tons	22,495,525	5,000* 3,125[b]	50* 5.3[b]	14.0*	21.0*	113[e]	113	314	472
206101	Raw cane sugar (convert to 96° basis)	do	6,200,301	10,000*	25.0*	-	-	62[e]	155	-	-
[2061, 2062 - combined cane sugar mill -	250 mg/l 700*mg/l 1,200 mg/l	--BOD_5[f]	and	150 mg/l[f] 1,200*mg/l 2,300 mg/l[f]	-----suspended solids[f]			172*	384* 1,004* 1,721*	215*] 1,721*] 3,300*]	
2063	Beet sugar	do	21,104,395	2,500* 3,055[c] 2,500 3,500[d]	20.0* 21.18[c] 30.46[d]	140* - 159.3[d]	-	49[e]	422	3,360	-
206	Sugar							220[e]	1,426	5,001	-

*Estimated

[a] U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics: Sugar and Confectionery Products, MC63(2)-20F." U.S. Government Printing Office, Washington, D.C. 1966.

[b] Industrial Waste Guide to the Cane Sugar Industry." USPHS Publication No. 691

[c] Industrial Waste Treatment Practice., E. F. Eldridge. 1st ed., McGraw-Hill Book Co., 1942

[d] Industrial Waste Guide - Beet Sugar, H. H. Black and G. N. McDermott, Sewage and Industrial Wastes, vol. 24, No. 2, February

[e] U. S. Bureau of the Census, Census of Manufactures, 1963. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Printing Office, Washington, D.C., 1966.

[f] Rudolfs, W., "Industrial Wastes - Their Disposal and Treatment." Reinhold Publishing Corp., New York, p. 478-479, 1953

Table 2F - National Industrial Waste Water Assessment, Manufacturing Year 1963
22- Food and Kindred Products - 208 Beverages

Code	Produce	Unit of Measure	Quantity	Waste Water Volume (Gallons)	BOD_5 (Pounds)	Suspended Solids (Pounds)	Waste Water Volume (Billions of Gallons)	BOD_5 (Millions of Pounds)	Suspended Solids (Millions of Pounds)
2082	Malt liquors & brewing by-products, total								
	Beer & ale, total	1,000 bbl	104,262	541,000* 180,000[a] 400,000[a] 500,000[a]	2,500* 1,020[a] 2,210[a] 4,250[a]	1,250* 510[a] 1,000[a] 2,000[a]	51	236	118
2083	Malt industry								
	Barley	1,000 bu	79,090	98,000*	250*	90*	7	19.8	4.0
	Malt	Cwt	509,402	75,000[b]	243[b]	45[b]			
2084	Wines, brandy & brandy spirits, total								
	Wines, total	1,000 wine gal	224,367	20,000*	520[a,c]*	130*	4	116.7	29.2
	Brandy, total	do	16,454	20,000[d]	1,700[a,d]	1,700*	.3*	28.0	28.0
2085	Distilled liquors, except brandy								
	Corn, total	1,000 bu	32,140	700,000*	540*	500*	26	20.7[i]	19.0
	Rye, total	do	5,882	711,500[a] 700,000[f]	200-3,100[e] 540[a,g,f]			[7.6[h]] [117.0[i]]	
2086	Soft drinks & carbonated waters, total,	1,000 cases	1,462,007	3,420* 10,700[k]	30.8* 30.8[k]	24.1* 24.1[k]	5	44.6	35.2
2087	Flavoring extracts & flavoring sirups, total	1,000 gal	428,243	-	-	-	1	8.0	-
208	Beverages						93	473.8	233

*Estimated

a/ Industrial Wastes, Willem Rudolfs, Reinhold Publishing Corp., LCC No. 52-9792, p. 99-131, 1953.

b/ Theories and Practices of Industrial Waste Treatment, N. L. Nemerow, Addison-Wesley Publishing Co., Reading, Mass., p. 334-343, 1963.

c/ Industrial Waste Treatment, E. B. Besselierre, McGraw-Hill Book Co., p. 107, 1952.

d/ Treatment and Utilization of Winery Wastes, Pearson et al., Industrial Waste Conference, Purdue University, p. 334-345, 1955.

e/ "Application of Waste to Product Ratios in the Fermentation Industries," R. K. Blaine and J. M. Van Lanen, Biotechnology and Bioengineering, vol. IV, p. 129-128, 1962.

f/ Chemical Technology Encyclopedia, Kirk-Othmer, p. 898.

g/ Water in Industry, "A Survey of Water Use in the Grain Beverage Distilling Industry," p. 60-61, January 1965.

h/ With complete industry recovery of by-products.

i/ Without by-product recovery.

j/ Assumes from ref. e, page 137 that reported dried feed recovery is 90% of potential (in-plant control).

k/ Wastes from the Soft Drink Bottling Industry, R. Porges and E. Struzeski, Jr., Proc. Industrial Waste Conference, Purdue University, p. 331-340, 1960.

Table 3G(1) - National Industrial Waste Water Assessment, Manufacturing Year 1963
22- Textiles - 2211 Weaving Mills, Cotton; 2261 Finishing Plants, Cotton

Code	Process	Production (1,000 lbs)	Unit Value per 1,000 Pounds: Waste Water Volume (Gallons per 1,000 lbs)[b]	Avg.	BOD_5 (Lbs. per 1,000 Lbs.)[b]	Avg.	Total Solids (Lbs. per 1,000 Lbs.)[b]	Avg.	Estimated Untreated Waste Water Load: Waste Water Volume (Bill.of Gals)	BOD_5 (Mill.of Pounds)	Total Solids (Mill.of Pounds)
	INDUSTRY 2211. -WEAVING MILLS, COTTON & INDUSTRY 2261. -FINISHING PLANTS, COTTON										
	Slashing & sizing	3,113,683[a]	60-940	500*	0.5-5.0	3.0*	47-67	55*	1.5[b]	9[b]	17[b]
	Desizing	4,245,000[a]	300-1,100	700*	14.8-16.1	15.0*	67-70	70*	3.0[b]	64[b]	30[b]
	Kiering	2,659,242[a]	310-1,700	1,000*	1.5-17.5	9.5*	19-47	35*	2.7[b]	25[b]	93[b]
	Scouring	2,659,242[a]	2,300-5,100	3,700*	1.36-3.02	2.2*	-	-	9.8[b]	6[b]	-
	Bleaching	1,729,719[a]	300-14,900	7,500*	5.0-14.8	10.0*	38-290	160*	13.0[b]	17[b]	280[b]
	Mercerizing	586,970[a]	27,900-36,950	32,000*	10.5-13.5	12.0*	185-450	320*	18.8[b]	7[b]	182[b]
	Dyeing (avg.):	1,516,493[a]	14,000*		20*		300*		21.2[b]	30[b]	455[b]
	Aniline black		15,000-23,000	20,000*	5-10	7.5*	100-200				
	Basic		18,000-36,000	27,000*	15-50	32.5*	150-250				
	Developed colors		8,900-25,000	17,000*	15-30	17.5*	325-650				
	Direct		1,700-6,400	4,000*	1.3-11.7	6.5*	25-250				
	Indigo		600-6,000	3,300*	1.8-9.5	6.0*	21-63				
	Naphthol		2,300-16,800	9,500*	2-15	8.0*	200-650				
	Sulfur		2,900-25,600	14,000*	2-250	126.0*	300-1,200				
	Vats		1,000-20,000	10,000*	12-30	21.0*	150-250				
									70	158[b] 460[c]	1,057[b]
2211, 2261	Total combined weaving mills & finishing plants, cotton								28 42	175 263	426 631
									70	438[a]	1,057

*Estimated

[a] Bureau of the Census data.

[b] PHS Industrial Waste Guide to the Cotton Textile Industry.

[c] The indicated BOD_5 based upon USPHS guide is 158 million pounds BOD_5 per year calculated on 1939 data. The New England Interstate Water Pollution Commission states in its publication "A Simplification of Textile Waste Survey and Treatment" (July 1950) as follows: Total pounds of BOD from mill = .047 x pounds desized + 0.47 x pounds kiered + .005 x pounds bleached + .005 x pounds mercerized + .025 x pounds dyed and printed. Using this formula the value of 460x 10^6 lbs of BOD_5 is obtained. It is also noted from the literature and other sources that 750 mg/l appears to be a representative average concentration for the BOD_5 of the waste waters from the total cotton processing industry. Certain cotton finishing plant effluents have been noted below 220 mg/l BOD_5 while others, especially those plants processing imported fabric may have BOD_5 concentrations above 1,500 mg/l. Therefore, the value of 438x10^6 lbs of BOD_5 is estimated based on assumed average concentration of 750 mg/l.

Figure 1*

FLOW SHEET—OPERATIONS FROM RAW COTTON TO FINISHED CLOTH

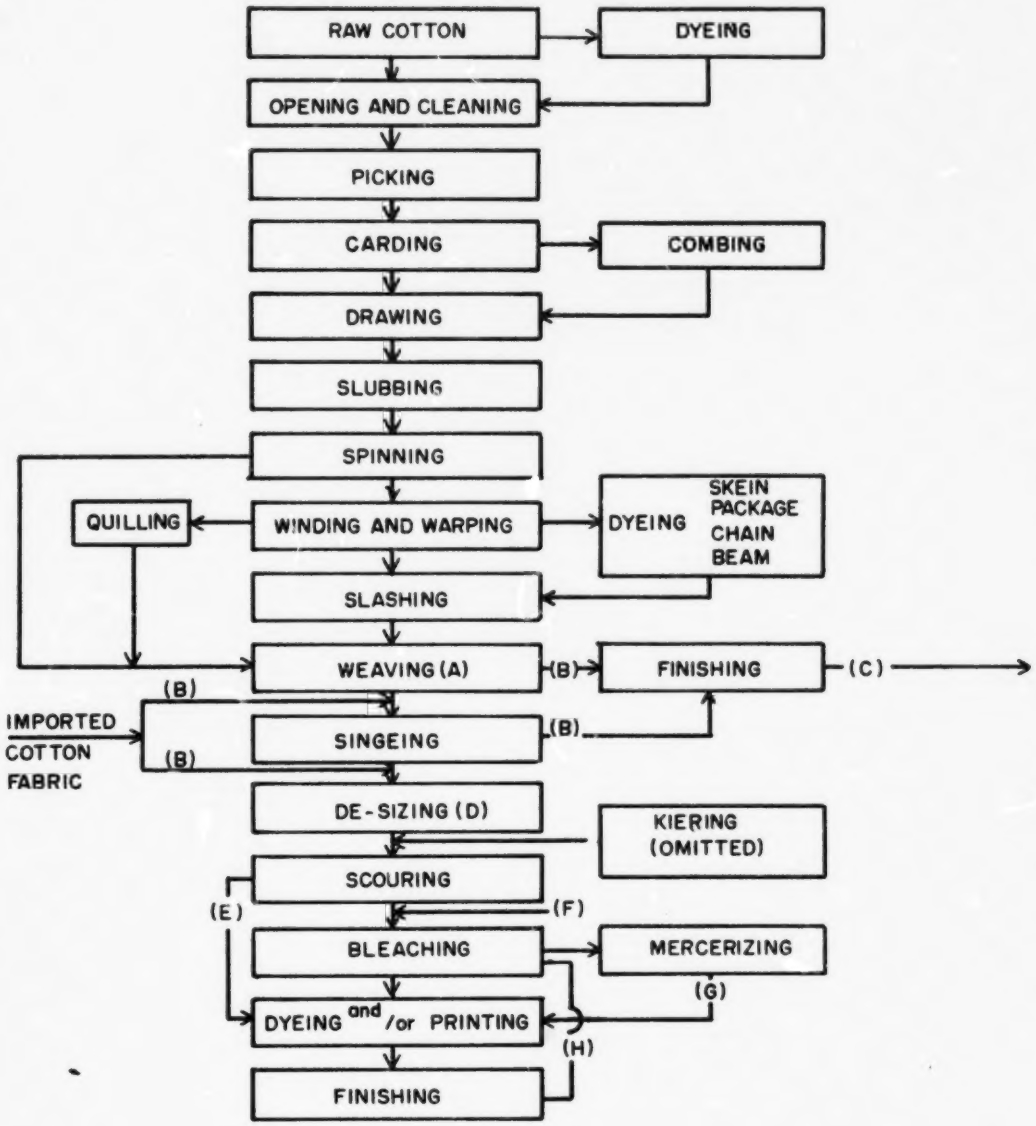

*Figure 1 extracted from: "Industrial Waste Guide to the Cotton Textile Industry." PHS Publication No. 677, 1959.

CODE	PROCESS OPERATIONS	WT. OF COTTON
(A)	Cotton cloth made in the United States	3,113,683
(B)	Total cotton processes (imported plus woven in the U.S.)	4,245,000
(C)	Cotton finished without desizing, kiering, scouring, bleaching, dyeing, and/or printing and mercerizing processes	1,585,758
(D)	Desized	2,659,242
(E)	Plain dyed and finished	929,523
(F)	Total bleached	1,729,719
(G)	Mercerized	586,970
(H)	Bleached and white finished	1,142,749

Note: all cotton in 1,000 lbs.

Table 2G(2) - National Industrial Waste Water Assessment, Manufacturing Year 1963
22- Textiles - 2221. Weaving Mills, Synthetic; 2262 Finishing Plants, Synthetic

Code	Industry	Production	Unit Value per 1,000 Pound of Fabric: Waste Water Volume (Gallons)	Unit Value per 1,000 Pound of Fabric: BOD_5 (Pounds)	Unit Value per 1,000 Pound of Fabric: Total Solids (Pounds)	Estimated Untreated Waste Load: Waste Water Volume (Billions of Gallons)	Estimated Untreated Waste Load: BOD_5 (Millions of Pounds)	Estimated Untreated Waste Load: Total Solids (Millions of Pounds)
2221	Weaving mills, synthetic	1,067,108* (266,777 1st quarter, 1963[a])	-	-	-	9[b]	-	-
2262	Finishing plants, synthetic					16[b]		
		Mill Consumption of Fibers, (1,000 lbs)						
	Rayon and acetate	1,471,000[c]	7,000* 5,000[d]-9,000[d]	60* 40-80[d], 50[e]	75* 50-100*[d]	10	88	110
	Other man-made	1,317,000[c]	20,000* 12,000[d]-25,000[d]	200* 30-800[d]	240*	26	263	316
						36	351	426
2221	Weaving mills, synthetic					16[f]	127[f]	55[f]
2262	Finishing plants, synthetic					28[f]	223[f]	271[f]
2221 2262	Total synthetics, weaving mills and finishing plants					44*[f]	351	426

*Estimated.

[a] U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics: Textiles Mills: Machinery, Fiber and Fabric Consumption, MC63(2)-22.1." U.S. Government Printing Office, Washington, D.C., 1965, p.

[b] U.S. Bureau of the Census, Census of Manufactures, 1963. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Printing Office, Washington, D.C., 1966

[c] Statistical Abstracts of the United States: 1966, 87th ed., p. 789, No. 1163, Washington, D.C., 1966. "Mill Consumption of Natural and Man-made Fibers: 1930-1965."

[d] "A Simplification of Textile Waste Survey and Treatment," New England Interstate Water Pollution Control Commission, J.W. Masselli, N.W. Masselli, and M. Burford. July 1959, p. 35-39, 67.

[e] An Industrial Waste Guide to the Synthetic Textile Industry, prepared by the Committee on Stream Sanitation Technology of the American Association of Textile Chemists and Colorists in Cooperation with the Nation Technical Task Committee on Industrial Wastes, U.S. Department of Health, Education and Welfare, PHS Publication No. 1320, p. 23, 1965.

[f] Based on dollar value added and computed from U.S. Bureau of the Census, Census of Manufactures, 1963, "Industry Statistics: Weaving Mills, MC63(2)-22A and Dyeing and Finishing Textiles, Except Wool Fabrics and Knit Goods, MC62(2)-22C." U.S. Government Printing Office, Washington, D.C., 1966.

Table 20(3) - National Industrial Waste Water Assessment, Manufacturing Year 1963
22- Textiles - 2231. Weaving & Finishing Mills, Wool

Code	Product	Unit of Measure (1,000 lbs)	Unit Values per 1,000 Pounds of Product: Waste Water Volume (Gallons)	BOD$_5$ (Pounds)	Suspended Solids (Pounds)	Alkalinity (Pounds)	Acidity (Pounds)	Estimated Untreated Waste Water Load: Waste Water Volume (Billions of Gallons)	BOD$_5$ (Millions of Pounds)	Suspended Solids (Millions of Pounds)	Alkalinity (Millions of Pounds)	Acidity (Millions of Pounds)
	INDUSTRY 2231. -WEAVING & FINISHING MILLS, WOOL											
	Wool fabrics and finished wool yarn, top and raw stocks, not spun or combed in the same establishment, total	253,339*[a,b]	72,000*[d] 70,000[e] 55,725[f]	400*[d] 400-600[e] 250[f] 45-500[h] 400-600[g]	800*[d] 800[f]	188[e] 188[f]	40.5[e] 40.5[f]	18	100	200	48	10
	(First quarter - 77,968 thousands of linear yards, or 311,876 thousands of linear yards for 1963.[a])	412,000[c] (scoured basis)										
	Conversion factor - 13.6 ounces per linear yard.[c])											

[a] U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics: Weaving Mills MC63(2)-22A and Finishing Textiles, Except Wool Fabrics and Knit Goods, MC63(2)-22C."

[b] U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics: Textile Mills: Machinery, Fiber and Fabric Consumption, MC63(2)-22.1," U.S. Government Printing Office, Washington, 1966.

[c] Statistical Abstracts of the United States, 1966, p. 788.

[d] Nemerow, N. L., "Theories and Practices of Industrial Waste Treatment," Addison-Wesley Publishing Co., Reading, Mass., p. 275-295, 1963.

[e] Gurnham, C. F., "Industrial Wastewater Control," Academic Press, New York, p. 375-393, 1965.

[f] Besselievre, E. E., "Industrial Waste Treatment," McGraw-Hill Book Co., New York, p. 193-195, 1952.

[g] "A Simplification of Textile Waste Survey and Treatment," New England Interstate Water Pollution Control Commission.

[h] "Pollution Sources in Wool Scouring and Finishing Mills and Their Reduction Through Process and Process Chemical Changes," New England Interstate Water Pollution Control Commission.

*Estimated

Table 2H - National Industrial Waste water Assessment, Manufacturing Year 1963
2H - Paper and Allied Products

Code	Product	Unit of Measure	Quantity	Unit Values per Unit of Measure: Waste water Volume (Gallons)	Unit Values per Unit of Measure: BOD_5 (Pounds)	Unit Values per Unit of Measure: Suspended Solids (Pounds)	Estimated Annual Untreated Waste Load: Waste water Volume (Billions of Gallons)	Estimated Annual Untreated Waste Load: BOD_5 (Millions of Pounds)	Estimated Annual Untreated Waste Load: Suspended Solids (Millions of Pounds)
2611111	Special alpha and dissolving wood pulp (sulfite and sulfate)	sh.tons	1,371,429	30,000*	30[a]	30*	1,142.1* 871[f] 41	4,135* 41	1,435* 14
2612	Other pulp (including wood) and pulp mill byproducts, except tall oil	do	(X)						
	Wood pulp (except special alpha and dissolving	do	30,971,466				1,101.1	4,094	1,394
	Sulfite, total	do	2,695,339	70,000* 12,330-98,500[b]	600[a]/486[c]	40[a]	173	1,431	160
2611216	Bleached	do	2,202,822	30,000-98,500[b]	538[a]	45[a]	154	1,185	143
2611226	Unbleached	do	482,517	40,000* 12,330-60,000[b]	510[a]	35[a]	19	246	17
	Sulfate, total	do	30,001,283	80,000* 10,000-111,325[b]	30[a]/77[c]	25[a] 50[a]	771 515	1,218 509	602 322
2611233	Bleached	do	6,438,460	60,000-111,325[b]	77[a]	23[a]	79	107	40
2611239	Semi-bleached	do	1,757,873	40,000-50,000[b]	51[a]	20[a]	177	502	240
2611243	Unbleached	do	11,309,951	10,000-20,000[b]	51[a]				
2611251	Soda wood pulp	do	390,382	22,000* 15,000-30,000[a]	400* 400[a]	50*	7.7	140	17.5
2611265	Groundwood, bleached and unbleached	do	3,596,293	8,000* 4,000-16,000[b,e]	30[a]/20[d]	50[d]	28.8	72	288
2611272	Semichemical	do	2,712,301	35,000* 30,000-40,000[a]	400[a]	-	95	1,085	-
	Pulp, other than wood, and miscellaneous pulp mill products,								
2611281	Cotton linter pulp	do	221,108	57,400[c]	200* 200-900[a] 26.9[c]	300* 300-500[a] 100[d]	12.6	44	66
2611285	Other pulp, including pulp made from straw, rag, flax, de-inked paper, bagasse, etc.	do	513,771	25,000* 20,000-35,000[c]	200* 100-500[a] 70[d]	500* 400-800[a] 450[d]	13.0	104	260
2611287	Turpentine sulfate (quantity in 1,000 gallons)	1,000 gals	44,412	-	-	-	-	-	-
2611289	Other cooking liquor byproducts (skimmings, binders, fuel, etc)		101,270	-	-	-	-	-	-
2621	Paper mills, except building paper mills, total	sh.tons					1,067[f] 382*	316*	369*
2621111	Newsprint	do	2,213,409	25,000* 20,000-35,000[b]	15* 10-20[a]	30* 20-60[a]	55	33	66
26212	Groundwood paper, uncoated	do	956,410	-	-	-	-	-	-
26213	Paper-machine coated paper	do	2,113,959	11,000*	40* 170[d]	100*	23	85	211
	Printing and covering paper, total	do	2,113,959		20-40[a]	50-100[a]			
2621311	Coated, 1 side	do	174,176	-					
2621313	Coated, 2 sides	do	1,939,783						
26214	Book paper, uncoated	do	1,886,278	11,000* 7,000-16,532[b]	30* 8.8[c]/40[c]	75*	20.7	35	141
2621412	Publication and printing	do	1,151,748	-	-	-	-	-	-
2621435	Body stock for coating	do	33,599	-	-	-	-	-	-
2621439	Other converting and miscellaneous book	do	700,931	-	-	-	-	-	-
26215	Fine paper, including thin paper	do	2,103,609	70,000* 70,000[c]	20* 20-40[a] [illegible]	75* 50-100[a] 20[d]/[illegible]	14.2	42	154

Table 2H - National Industrial Waste Water Assessment, Manufacturing Year 1963
26- Paper and Allied Products (Cont.)

Code	Product	Unit of Measure[a]	Quantity	Unit Values per Unit of Measure: Waste Water Volume (Gallons)	Unit Values per Unit of Measure: BOD_5 (Pounds)	Unit Values per Unit of Measure: Suspended Solids (Pounds)	Estimated Annual Untreated Waste Load: Waste Water Volume (Billions of Gallons)	Estimated Annual Untreated Waste Load: BOD_5 (Millions of Pounds)	Estimated Annual Untreated Waste Load: Suspended Solids (Millions of Pounds)
26216	Coarse paper	sh.tons	4,250,907						
	Unbleached kraft paper, total	do	3,184,969	16,000* 2,000-25,572[b]	5-15[c], 10* 15.3[d] 9.5[e]	15-25[c], 35* 36[d] 47[e]	50	32	80
2621632	Glassine, greaseproof and vegetable parchment	do	193,711	50,000* 28,321-75,553[b]	15* 15-25[c] 4.3[d], 10.0[c]	20* 10-12[d] 27.5[e]	9.7	29	39
	Other coarse paper, total	do	872,127	16,000*	10*	25*	14.0	9	22
2621759	Special industrial paper (excluding windshield wiper stock and industrial wipe)	do	911,570	15,000*	10*	25*	14.6	9	23
26218	Sanitary tissue stock	do	2,576,406	20,000* 8,000[c], 45,124[b]	15* 12.8[d], 18-30[c] 8.9[e]	50* 36[c], 40[d], 50-100[c]	52	39	129
2631	Paperboard mills, total	do	18,380,108	3,000* 2,000-15,000[c]	40* 30[d] 25-60[e]	60* 50-70[c]	551 543[c]	735	110
2661	Building paper & board, total	do	2,591,639	10,000*	250* 30[c] 383[d], 150-250[c]	200* 325[d], 50-100[c]	26[f] 25[f]	648	518
26	PAPER AND ALLIED PRODUCTS								
2611	Pulp mills						1,142	4,135	1,435
2621	Paper mills, except building						382	316	869
2631	Paperboard mills						551	735	110
2661	Building paper and board mills						26	648	518
			Subtotal 2611, 2621, 2631, and 2661				2,101	5,834	2,930
			Estimated remaining				43*	72*	36*
			GRAND TOTAL 26- PAPER AND ALLIED PRODUCTS				2,144*	5,906*	2,966*

*Estimated

[a] U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics, Pulp, Paper and Board Mills, MC63(2)-26A," Tables 6A and 7A. U. S. Government Printing Office, Washington, D. C., 1966.

[b] "White Water Wastes from Paper and Paperboard Mills," New England Interstate Water Pollution Control Commission by Wesleyan University, December 1963.

[c] Water Requirements of the Pulp and Paper Industry, Geological Survey Water-Supply Paper 1330-A, 1955, 71 p.

[d] Theories and Practices of Industrial Waste Treatment, N. L. Nemerow, Addison-Wesley Publishing Co., Reading, Mass., p. 379, 1963.

[e] Rules and Regulations, Sanitary Water Board, Commonwealth of Pennsylvania Department of Health, Article 700, "Industrial Wastes, Section 6. Pulp, Paper and Paperboard Wastes," p. 4-5.

[f] Industrial Wastewater Control, C. Fred Gurnham, Academic Press, New York and London, p. 357-373, 1965

[g] U.S. Bureau of the Census, Census of Manufactures. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Printing Office, Washington, 1963.

Table 21 - NATIONAL INDUSTRIAL WASTE WATER ASSESSMENT, MANUFACTURING YEAR 1963

28 Chemicals and Allied Products

(Water values in Billion Gallons/yr; pH Range in pH Units; All others in Million Pounds/yr)

Code	Water Use Region Industry Group	Water Use Total	Water Use Process	Total Water Discharged	BOD	COD	Total Solids	Total Dissolved Solids	Total Suspended Solids	Phenolic Compounds	Alkalinity	Oil & Grease	Chlorides	pH Range	Remarks
28	**Chemicals & Allied Products**	3,889	564	3,662	9,680	33,410	>69,340		>1920	145	>32,830	>1,350		1.0-12.0	
281	**Basic Chemicals**	3,020	431	2,887	8,420										
2812	Alkalies & Chlorine	528	16	509	40	1,970	23,010	1,370	790	.2	340		4,440	6.4-11.4	Na 960 & Cl_2 85
2813	Industrial Gases														
2814	Cyclic (coal tar) Crudes														
2815	Intermediate Coal Tar Products	108	9	100	320	15,920	3,020		11	15	440	74		7.0-12.0	
2816	Inorganic Pigments														
2818	Organic Chemicals, n.e.c.	1,708	314	1,660	7,200		43,240		80	130	32,050	1,230		2.5-12.0	
2819	Inorganic Chemicals,n.e.c.	499	74	447	860	2,170			930					2.0-9.8	
282	**Fibers, Plastics, Rubbers**	530	67	509	920										
2821	Plastic Materials & Resins	218	25	206	420										
2822	Synthetic Rubber	61	11	57	30										
2823	Cellulosic Man-made Fibers	152	23	150	380										
2824	Organic Fibers, Non-cellulosic	98	8	96	90										
283	**Drugs**	65	5	42	160										
2831	Biological Products														
2833	Medicinals & Botanicals														
2834	Pharmaceutical preparations	28	3	25	80	160			20					1.0-11.0	
284	**Cleaning & Toilet Goods**	32	2	23	50										
2841	Soap & other Detergents	19	2	12	50	45			44			35			ABS 4
2842	Polishes & Sanitation goods														
2843	Surface Active Agents														
2844	Toilet Preparations														
2851	**Paint & Allied Products**	5	1	5	4				3						
2861	**Gum & Wood Chemicals**	26	2	24	90	63	40		40	.01				3.7-11.4	
287	**Agricultural Chemicals**	115	32	90											
2871	Fertilizers	113	32	89											
2872	Fertilizers, mixing only														
2879	Agricultural Chemicals,n.e.c.														
289	**Miscellaneous Chemical Products**	94	24	81	200										
2891	Glue & Gelatin	12	6	11	100										
2892	Explosives	28	2	27	10		29		7			12		5.5-7.0	
2893	Printing Ink														
2895	Carbon Black														
2899	Chemical Preparations,n.e.c.	36	4	33	30										

Table 2J - National Industrial Waste Water Assessment, Manufacturing Year 1963
22- Petroleum and Coal Products - 2911 Petroleum Refining

Code	Industry	Flow (Gal.)	Waste Water Discharged/1,000 Bbl Crude Oil Refined — Characteristics (Pounds)							Total Untreated Wastes — Characteristics (Millions Pounds/Year*)							Flow (Billion Gal./Year)
			BOD_5	COD	Total Oils**	Ammonia Nitrogen**	Phenols	Total Sulfides**	Suspended Solids**	BOD_5	COD	Total Oils**	Ammonia Nitrogen**	Phenols	Total Sulfides**	Suspended Solids**	
2911	Petroleum refining	770,000[a]	200[a]	300[a]	230[a]	13[a]	26[a]	161[a]	273[a]	628[a]	942[a]	722[a]	41[a]	82[a]	505[a]	857[a]	2,414[a]
		410,000[b]	100[b]	150[b]	27[b]	4[b]	15[b]	44[b]	75[b]	314[b]	471[b]	85[b]	13[b]	47[b]	138[b]	235[b]	1,287[b]
		450,000[c]	150[c]	235[c]	78[c]	8[c]	20[c]	81[c]	146[c]	471[c]	738[c]	245[c]	25[c]	63[c]	254[c]	458[c]	1,412[c]

Production (1963)* - 8,600,000 bbl crude oil refined/day

or

3,156,402,000 bbl crude oil/year[2]

*Estimated

**One refinery, estimated

a/ High value

b/ Low value

c/ Median value

References:

1. Otts, L. E., Jr., "Water Requirements of the Petroleum Refining Industry," Geological Survey Water-Supply Paper 1330-C.

2. U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics: Petroleum Refining and Related Industries, MC63(2)-29A." U.S. Government Printing Office, Washington, 1966. Table 7A.

3. U.S. Bureau of the Census, Census of Manufactures. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Printing Office, Washington, 1966.

4. Gurnham, C. F., "Industrial Wastewater Control," Academic Press, New York, 1965.

5. Nemerow, N. L., "Theories and Practices of Industrial Waste Treatment," Addison-Wesley Publishing Co., Reading, Mass., 1963.

6. Rudolfs, W., "Industrial Wastes - Their Disposal and Treatment," Reinhold Publishing Corporation, New York, 1953.

7. Eldridge, E. F., "Industrial Waste Treatment Practice," McGraw-Hill Book Co., New York, 1942.

1 year = 365 days

Table 3K - National Industrial Waste Water Assessment, Manufacturing Year 1963
31- Leather - 3111 Leather Tanning and Finishing

Waste Water Characteristics per 1,000 Pounds of Hides Processed

Code	Industry	Waste Water Volume (Gallons)	BOD_5 (lbs)	Total Solids (lbs)	Volatile Solids (lbs)	Suspended Solids (lbs)	Hardness[1] (lbs)	Sodium Chloride (lbs)	Protein[2] (lbs)	Ammonia Nitrogen (lbs)	Sulfides[3] (lbs)	Chromium (lbs)
3111	Leather tanning and finishing	8,000[a]	100[a]	536[a]	107[a]	201[a]	107[a]	201[a]	67[a]	4[a]	8[a]	5[a]
		5,000[b]	70[b]	252[b]	50[b]	84[b]	67[b]	126[b]	42[b]	2.5[b]	4.2[b]	2[b]
		6,500[c]	85[c]	324[c]	76[c]	135[c]	86[c]	162[c]	54[c]	3.2[c]	5.9[c]	3[c]

Total Untreated Waste Water Characteristics

Code	Industry	Waste Water Volume (Billions of Gallons)	BOD_5 (Mil. of lbs)	Total Solids (Mil. of lbs)	Volatile Solids (Mil. of lbs)	Suspended Solids (Mil. of lbs)	Hardness[1] (Mil. of lbs)	Sodium Chloride (Mil. of lbs)	Protein[2] (Mil. of lbs)	Ammonia Nitrogen (Mil. of lbs)	Sulfides[3] (Mil. of lbs)	Chromium (Mil. of lbs)
3111	Leather tanning and finishing	15.3[a]	191.8[a]	1,028.[a]	205.[a]	385.[a]	205.[a]	385.[a]	128.[a]	7.6[a]	15.3[a]	9.5[a]
		9.[b]	134.3[b]	483.4[b]	95.[b]	161.[b]	128.[b]	241.[b]	80.[b]	4.7[b]	8.0[b]	3.8[b]
		12.5[c]	163.[c]	621.6[c]	145.[c]	259.[c]	165.[c]	310.[c]	102.[c]	6.1[c]	11.[c]	5.7[c]

Production of hides[3]

Type of Hide	Number of Hides	Unit wt. lbs/hide	lbs/year
Cattle	21,654,000	50	1,082,700,000
Calf and kid	5,596,000	10	167,880,000
Goat and kid	14,213,000	10	357,825,000
Sheep and lamb	31,891,000	30*	956,730,000
total	73,354,000		2,565,135,000

*Estimated

1/ Hardness expressed as calcium carbonate ($CaCO_3$).

2/ Protein as protein (organic nitrogen).

3/ Sulfides as total sulfides.

a/ High value.

b/ Low value.

c/ Median value.

References:

1. Masselli, J. W., Masselli, N. W., Burford, G. M., "Tannery Wastes - Pollution Sources and Methods of Treatment," New England Interstate Water Pollution Control Commission, Boston, Mass., 1952.

2. U. S. Bureau of the Census, Census of Manufactures. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Printing Office, Washington, 1965.

3/ Statistical Abstracts of the United States, 1966.

4/ Gurnham, C. F., "Industrial Wastewater Control." Academic Press, New York, 1965.

5/ Nemerow, N. L., "Theories and Practices of Industrial Waste Treatment." Addison-Wesley Publishing Co., Reading, Mass., 1963.

6/ Rudolfs, W., "Industrial Wastes - Their Disposal and Treatment." Reinhold Publishing Corp., New York, 1953.

7/ Eldridge, E. F., "Industrial Waste Treatment Practice." McGraw-Hill Book Co., New York, 1942.

Table 2L - National Industrial Waste Water Assessment, Manufacturing Year 1963
33- Primary Metal Industries - 331. Steel Rolling and Finishing
3312 Blast Furnaces and Rolling Mills

Industry Code	Industry Group	Unit of Measure	Carbon Steel 1963 Production	Alloy Steel Except Stainless 1963 Production	Stainless Steel 1963 Production	1963 Total Production	Untreated Waste Water Characteristics				Estimated Untreated Waste Water Load			
							Waste Water Volume (Gallons/ sh.ton)	Suspended Solids (Pounds/ sh.ton)	Oil (Pounds/ sh.ton)	Iron as Fe (Pounds/ sh.ton)	Waste Water Volume (Billions of Gallons)	Suspended Solids (Millions of Pounds)	Oil (Millions of Pounds)	Iron as Fe (Millions of Pounds)
3312211	Ingots	sh.tons	98,845,947	8,975,689	1,188,982	109,010,618								
	Semi-finished shapes & forms:													
3312213	Blooms billets, slabs, sheet bars, & tin plat bars	do	75,690,811	6,024,382	914,315	93,672,652	low 630	0.67	0.23	0.35				
3312215	Tube rounds	do	2,468,629	700,638	44,693		avg 750	1.0	0.50	0.36	70	94	47	36
3312217	Skelp	do	3,315,283				high 1,030	1.0	0.74	0.38				
3312219	Wire rods	do	4,449,656	64,245										
	Finished shape & forms - Plates:					91,711,320								
3312411	Floor plates	do	163,543	762,702	59,369	7,805,575	2,260	2.3	1.10	--	18	18	8.6	--
3312413	Plates, other than floor plates	do	6,819,961											
3312415	Structural shapes	do	4,833,169	183,650		5,016,819	1,970	0.66	0.31	--	10	3.3	1.6	--
	Piling:					384,305								
3312417	Sheet piling	do	384,305				2,500*	2.0*	1.0*	2.0*	1	0.8	0.4	0.8
3312419	Bearing piles													
	Sheets & Strip:- Sheets:													
3312311, 15	Hot rolled & annealing	do	12,906,587	376,225	190,491	13,433,303	2,000*	2.0*	1.0*	2.0*	27	27	13	27
3316711	Cold rolled	do	15,480,678	77,401	152,078	20,435,094	1,370	nil	1.9	nil	28	nil	38	nil
3312313	Galvanized	do	3,700,482	--										
3312314, 22	Electrical (sheets & strip)	do	53,835	630,803										
3312317	Long terne	do	339,817											
	Strip:													
3312319	Hot rolled	do	1,761,156	49,232	69,742	1,880,130	2,040	3.20	0.37	1.9	6	6.0	0.7	3.5
3316715	Cold rolled	do	1,338,479	25,117	238,483	1,881,627	1,500*	nil*	2.0*	nil*	3	nil	3.8	nil
3312321	Galvanized	do	279,548	--										
	Tin mill products:													
3312324, 25	Black plate (including chemically treated black plate)	do	452,558			5,408,207	1,500*	nil*	2.0*	nil*	8	nil	11.2	nil
	Tinplate:													
3312326	Hot dipped	do	141,275											
3312327	Electrolyte													
3312329	Terneplate (short ternes)	do	5,013,770											

22.

Table 2L - National Industrial Waste Water Assessment, Manufacturing Year 1963
33- Primary Metal Industries - 331. Steel Rolling and Finishing
3312 Blast Furnaces and Rolling Mills (Cont.)

Industry Code	Industry Group	Unit of Measure	Carbon Steel 1963 Production	Alloy Steel Except Stainless 1963 Production	Stainless Steel 1963 Production	1963 Total Production	Untreated Waste Water Characteristics: Waste Water Volume (Gallons/ sh.ton)	Suspended Solids (Pounds/ sh.ton)	Oil (Pounds/ sh.ton)	Iron as Fe (Pounds/ sh.ton)	Estimated Untreated Waste Water Load: Waste Water Volume (Billions of Gallons)	Suspended Solids (Millions of Pounds)	Oil (Millions of Pounds)	Iron as Fe (Millions of Pounds)
	Bars:													
	Hot-rolled bars, except concrete:													
3312421	**Hollow drill steel**	do	6,917,213	1,947,014	57,227	12,141,446	3,490	6.0	0.28	3.27	42	72	3.4	40
3312423	**All other**													
	Concrete reinforcing bars:													
3312425	**Rolled from new billets**	do	3,042,021											
3312427	**All other**	do	177,971											
3312611	**Cold-finished bars**	do	316,806	214,212	75,560	683,094	2,000*	nil*	2.0*	nil*	1	nil	1.4	nil
3312429	**Tool steel bars**	do	9,034	16,803										
				50,679										
	Pipe and tubes:					7,702,054								
3317611	**Standard pipe**	do	2,339,441	---										
3317612	**Line pipe**	do	1,923,580	121,679							23	15	3.9	15
3317613	**Oil country goods**	do	1,222,903	307,519			3,000*	2.0*	0.5*	2.0*				
3317619	**Miscellaneous**	do	244,478	11,608										
3317614	**Pressure tubing**	do	224,661	38,370										
3317615	**Mechanical tubing**	do	910,541	351,274										
	Wire:					3,609,299					11	7.2	1.8	7.2
3315511	**Plain wire**	do	2,220,276	59,809										
3315515	**Galvanized wire**	do	332,078											
3315519	**Other coated wire**	do	111,009											
	Wire products:													
3315821	**Nails and staples**	do	338,956											
3315951	**Barbed and twisted wire**	do	113,436											
3315621	**Wire fence, woven & welded**	do	129,298											
3315955	**Bale ties**	do	70,834											
3315111	**Wire rope and cable**	do	98,658											
3315131	**Wire strand**	do	96,644											
3315771	**Woven wire netting**	do	38,301											
	Rails, wheels, & track accessories:					1,130,373					3	2.3	0.6	2.3
	Rails:													
3312011	**Standard tee**		506,281											
3312012, 13	**All other**		31,491											
3312014	**Rail joints and tie plates**		168,249											
	Wheels, rolled (including tires and rims)		269,548											
3312019	**Other rolled and drawn carbon steel products**		141,94-	12,05										
	TOTAL ROLLING AND FINISHING										251	245.6	135.[illegible]	120.8

23

Table 1 - National Industrial waste water [illegible], Characteristic Year [illegible]
33. Primary Metal Industries [illegible]
331. Blast Furnaces and [illegible]

Industry Code	Industry Group	Unit of Measure	1963[a] Production	1964[b] Production	Estimated 1964 Raw Material Consumption 1,000 sh.tons of coal	Untreated Liquid Waste Characteristics: Unit Waste Water Volume (Gal/unit)	BOD_5 (lbs/unit)	Thiocyanate (SCN) (lbs/unit)	Total $NH_3(n)$ (lbs/unit)	Cyanide as CN (lbs/unit)	Phenols (lbs/unit)	Waste Water Volume (Billions Gal./yr)	Estimated Untreated Waste Water Load: BOD_5 (Millions of Pounds)	Thiocyanate SCN (Millions of Pounds)	Total $NH_3(n)$ (Millions of Pounds)	Cyanide as CN (Millions of Pounds)	Phenols (Millions of Pounds)
3312111	Coke, except screenings & breeze	1,000 sh.tons	52,592	51,045	75,311[c]												
3312112	Screening & breeze	1,000 sh.tons	3,434		80,902[b]	2,320[c]	1,180[c]	108[c]	144[c]	10[c]	200[c]	188	95.5	8.7	11.4	0.8	16.2
3312131	Coke oven gas	Mil.cu.ft.	1,263,445														
3312141	Ammonia (sulfate & liquor)	-	-														
3312151	Crude tar	1,000 gal.	651,294														
3312161	Tar derivatives	-	(x)														
3312171	Crude light oil	1,000 gal.	195,253														
3312181	Light oil derivatives		194,160														

						Waste Water Flow (Gal/ton)	Total Susp.Solids (lbs/ton)	Vol.Susp. Solids (lbs/ton	Iron as Fe (lbs/ton)	Cyanide as CN (lbs/ton)	Fluorides as F (lbs/ton)	Waste Water Volume (Billions Gal/yr)	Total Susp.Solids (Millions of Pounds)	Vol.Susp. Solids (Millions of Pounds)	Iron as Fe (Millions of Pounds)	Cyanide as CN (Millions of Pounds)	Fluorides as F (Millions of Pounds)
	Blast furnace products:																
3312191	Pig iron with silicon up to 6%	1,000 sh.tons	70,781	85,600	Gas Washer	3,300[c]	46[c]	5.0[c]	18[c]	0.024[c]	0.03[c]	282	3,936	426	194	2.1	2.5
3312192	Slag	1,000 sh.tons	(x)		Precipitator	800[c]	1.0[c]	0.1[c]	0.1[c]	-	-	68	86	9	9	-	-
3312193	Sinter from ore, dust & other materials	1,000 sh.tons	44,675														
3312194	Blast furnace	Mil.cu.ft.	3,750,237														
3312195, 96, 99	Blast furnace ferroalloys																
3313111	Other ferro-alloys, except ferrochrome & ferrosilicon	sh.tons	1,381,371		1,721,000												
3313411, 98																	
										Blast furnace total		350	4,024	437	213	2.1	2.5

34

Table 2L - National Industrial Waste Water Assessment, Manufacturing Year 1963
33- Primary Metal Industries - 331.Steel Rolling and Finishing
3312 Blast Furnaces and Rolling Mills (Cont.)

Industry	Estimated 1963 Acid Pickled Steel (Tons)	Type of Process	Untreated Waste Water Characteristics: Waste Water Volume (Gallons/sh.ton)	Acidity Mineral Acid as H_2SO_4 (Pounds/sh.ton)	Total Iron as Fe (Pounds/sh.ton)	Estimated Untreated Waste Water Load: Waste Water Volume (Billions of Gallons)	Acidity Mineral Acid as H_2SO_4 (Millions of Pounds)	Total Iron as Fe (Millions of Pounds)
Total Acid Pickling Waste Water, including rinse waters	41,442,464	Batch	10	5.2	5.2			
		(Avg.)	200	18.0	12.0	10.2	925	6.7
		Continuous	260	21.2	14.0			

	Waste Water Volume (Billions of Gallons)	Suspended Solids (Millions of Pounds)	Iron as Fe (Millions of Pounds)	BOD_5 (Millions of Pounds)
3312 Blast furnaces & rolling mills, total	799	4,270	910	164

*Estimated.

†135 million pounds of oil is approximately equivalent to 68 millions of pounds of BOD_5.

1. "Industrial Wastes Guide - By-product Coke Industry," H. H. Black, G. N. McDermott, C. Henderson, W. A. Moore, and H. R. Pahren. Sew. & Indus. Waste, vol. 29, No. 1, January 1957.
2. "Study of Phenols in Process Effluents and Efficiency of Phenol Recovery Unit - Donner-Hanna Coke Corp., Buffalo, New York. Prepared by H. A. Anderson, USPHS IJC Field Unit.
3. "Reducing Phenol Wastes from Coke Plants," Steel Industry Action Committee, Ohio River Valley Water Sanitation Commission, January 1953.
4. "Industrial Waste Guide - Blast Furnace Department of the Steel Industry," H. H. Black, and G. N. McDermott. Sew. and Indus. Wastes, vol. 26, No. 8, August 1954.
5. "Dust Recovery Practice at Blast Furnaces," Steel Industry Action Committee, Ohio River Valley Water Sanitation Commission, January 1958.
6. "Rolling Mills - an Industrial Waste Guide to Steel Rolling Mills," PHS, Environmental Health Center, October 1951. (Restricted.)
7. "Industrial Waste Survey Report - Firestone Tire and Rubber Company, Riverview, Mich.," May 1953. PHS, Environmental Health Center. (Restricted.)
8. "Industrial Waste Survey Report - Geneva Works - Columbia-Geneva Division, United States Steel Co.," May 24-June 23, 1951. PHS, Environmental Health Center. (Restricted)
9. "Industrial Waste Survey Report - The Republic Steel Corporation - A Study of the Characteristics of Liquid Wastes from a Steel Mill," January 23 to February 24, 1950. PHS, Environmental Health Center. (Restricted.)
10. "Industrial Waste Survey Report - Bethlehem Steel Company - A Study of the Characteristics of Liquid Wastes from an Integrated Steel Mill," 1949-1951. (Restricted.)
11. "Industrial Waste Survey Report - Great Lakes Steel Corp", March 28-May 25, 1955. PHS, Sanitary Engineering Center. Prepared for the IJC, United States and Canada. (Restricted)

SIC 3312 BLAST FURNACE & STEEL MILLS

ESTIMATE OF

STEEL PICKLING

1963 MANUFACTURING YEAR

Estimate of Production of Pickled Steel Products - 1963

	(1000 net tons)
Cold Rolled Sheets	17,195
Cold Rolled Strip	1,662
Galvanized	4,058
Long Ternes	211
Black Plate	6,004
C F Bars	1,556
Tool Steel	91
Wire, Nails, etc.	3,366
HR Sheets & Strip (15%)	1,624
Galvanized Pipe	587
Electrical Sheets & Strip	569
1963 TOTAL PICKLED PRODUCTS:	36,923

NOTES:

1) The pickling of 3,366,354 tons of wire required 24,321 tons of 100% H_2SO_4.

2) Use of Sulfuric Acid by Industry 3312 - BLAST FURNACES AND STEEL MILLS: 1,175,467 sh. tons (1963) or 2,350 x 10^6 pounds.

	1963 H_2SO_4 (Millions of Pounds)
Total Acid Utilized	2,350
Less - Sulfuric Acid for Coke	970
Net Pickling Acid	1,380

3) Pounds of H_2SO_4 per Ton of pickled steel product:

$$\frac{1,380,000,000 \text{ lbs of } H_2SO_4}{36,923,000 \text{ Tons of Steel}} = 37.4 \text{ lbs } H_2SO_4 \text{ per Ton of steel pickled.}$$

Table 2M - National Industrial Waste Water Assessment, Manufacturing Year, 1963
333- Primary Nonferrous Metal - 3334 Primary Aluminum

Code	Industry Group	Unit of Measure	Year	Production (Short Tons)	Process or Classification	Calculated Water Intake (%)[c]	Calculated Water Intake (Billions of Gallons)[d]	Reported Water Intake (Billions of Gallons)[e]	Waste Water Volume (Gal/lb)	Fluoride (lbs/lb)	Total Solids (lbs/lb)	Waste Water Volume (Billions of Gal/yr)	Fluoride (10^6 lbs)	Total Solids (10^6 lbs)
	Raw materials:													
281951	Alumina	Gr wt. sh.tons	1953	2,613,000[a]					0.17[f]		0.15[b]			
			1958	3,188,000[a]							0.25	1.7		2,500
			1963	4,987,000[a]							0.30			
999812	Copper & copper base alloy scrap (purchased scrap only)	Sh.tons		4,566[b]										
	Products:				Process:									
3334111	Made in primary aluminum refineries	Sh.tons	1953	1,252,000[a]	Cooling condenser water for thermo-electric power generation	82.5	162	154	35.0			162[c]		
			1958	1,566,000[a]					0.04[f]	0.015				
			1963	2,315,000[a]	Gas scrubber	12.9	25.4		5.5[f]	.025		25.4	116	
			1965	2,754,000[a]					28.0[f]	0.03				
					Rectifier & transformer	2.2	4.3		0.9			4.3		
					Sanitary & plant	1.4	2.8		0.6			2.8		
					Electrode plant	0.2	0.4		0.09			0.4		
					Direct chill billet casting	0.2	0.4		0.09			0.4		
					Engine cooling	0.2	0.4		0.09			0.4		
					Air compressor cooling	0.1	0.2		0.04			0.2		
					Boiler feed make-up	0.1	0.2		0.04			0.2		
						99.8	196.6		42.35			196.6[c]		
					Classification:									
					Process			13				-		
					Other cooling & condensing			15				-		
					Boiler feed, sanitary service & other uses			14				-		

a/

b/ U.S. Bureau of the Census, Census of Manufactures, 1963. "Industry Statistics, Smelting and Refining of Nonferrous Metals and Alloys," Table 7A. U.S. Government Printing office, Washington, 1966.

c/ U.S. Department of the Interior, Geological Survey, Water Supply Paper 1330-C, "Aluminum," 1953.

d/ Calculated on basis of 197 billion gallons per year water intake.

e/ U.S. Bureau of the Census, Census of Manufactures. "Water Use in Manufacturing, MC63(1)-10." U.S. Government Printing Office, Washington, 1966.

f/ Industrial Wastewater Control, C. Fred Gurnham, Academic Press, New York and London, p. 255-284, 1965.